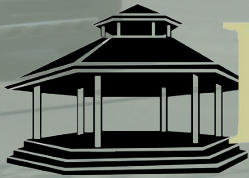




The City of



DEXTER

*Michigan*

**ENGINEERING STANDARDS**

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## **Development Requirements and Procedures**

### **A. General Plan Review Procedures:**

1. The plan review and approval process consists of two phases, the Preliminary Site Plan and the Final Site Plan, both of which must be completed before construction can begin.

Detailed descriptions of the preliminary and final site plan review processes and requirements are subsequently described in Sections B and C. The platting process and requirements are prescribed by the Subdivision Control Act, Act 288 of the Public Acts of 1967.

A copy of the site plan application is included in the Appendix and is available online at [www.dextermi.gov](http://www.dextermi.gov). Original copies should be obtained from the Zoning Office for completion and submittal to the City.

#### **Preliminary Site Plan**

The first phase includes submitting preliminary site plans, application, and fees to the City of Dexter. The Zoning Office distributes the plans to the appropriate City departments and outside consultants. These review agents do a conceptual plan review of the plan to verify that it meets zoning ordinances, basic City standards, and is generally feasible. The conceptual plan review is conducted to ensure that the project can be serviced by sanitary and water utilities, that the necessary storm sewer and detention are proposed, and that the proposed road widths, paving grades and general grading of the site will meet City standards. The Planning Commission reviews the comments and makes a recommendation to the City Council to approve or deny the plans.

#### **Final Site Plan**

The second phase begins when the City Council approves the preliminary site plan. The developer then submits final site plans that include detailed engineering plans and fees to the City of Dexter. The Zoning Office distributes the plans to the appropriate City departments and consultants who perform a detailed review of the plans. The Planning Commission reviews the comments and makes a recommendation to the City Council to approve or deny the plans.

2. Once the City Council has approved the site plan, the applicant must obtain all required permits before construction. The City Engineer will advise the City regarding the required permits, (see Section E) and the amount of the initial inspection deposit. The Zoning office will issue an approved copy of the site plan and application. The applicant will take these copies to the Washtenaw County Building Department to obtain a building permit.

3. An applicant may, at the applicant's discretion and risk and with approval of the Community Development Manager, combine the two phases, Preliminary & Final Site Plans, in a single Combined Site Plan application for approval. The Community Development Manager shall have the authority to require separate preliminary site plan and final site plan submittals where, in its opinion, the complexity and/or size of the proposed development so warrant. An applicant submitting a site plan for Combined Site Plan review shall submit seventeen (17) complete sets of plans with the combined site plan application. Combined site plan submittal will not be accepted for any development consisting of two (2) or more phases.

## **B. Preliminary Site Plan Requirements:**

1. The applicant seeking site plan approval from the City of Dexter is strongly preparing the plans. It is important that the plan reflect the requirements necessary to assure passage through the City reviews and approvals. Seventeen (17) complete sets of folded preliminary site plans will be required for the preliminary site plan application.
2. Once the applicant has reviewed the project with staff and prepared a complete preliminary site plan following these standards, a submittal to the City Planning Commission is in order. All documents and fees required for Planning Commission approval must be received by the City according to the Planning Commission calendar prior to submittal to the Planning Commission. A schedule of regular meeting dates is posted for public display at the City Office.
3. When the completed plan has been received at the City Zoning Official, it will be distributed to the staff and consultants for review and comments. Plans are reviewed to determine the practicality of the project and impact on services and surrounding properties. Compliance with City standards and ordinances will also be reviewed. Special engineering design considerations may also be addressed. Any items deviating from the City Standards and Details must receive written approval from the City staff and City Engineer, and be approved by the City Council.
4. Upon completion of the review, the City Engineer will return one set of plans to the Design Engineer with any necessary revisions and/or corrections noted on the plans and/or in a review letter. If necessary, directions will be given at that time as to how many plans must be resubmitted. The plan will be returned to the Design Engineer as often as is necessary to meet City requirements.
5. The City Zoning Official will assemble all comments and provide them to the Planning Commission for their review. The Planning Commission will recommend that the City Council either approve or deny the plan. If the plan is approved by the City Council, the applicant may begin preparing final site plans.

6. The preliminary site plan must conform to the requirements of the site plan application form as well as those items required on the preliminary site plan checklist.

### **C. Final Site Plan Requirements:**

1. Before final site plan approval is granted by the City Council, the plans must first be reviewed by the Zoning Office, the City Engineer, the City Planner, the Dexter Area Fire Department and the City Planning Commission.
2. The final site plan must conform to the requirements of the site plan application form as well as those items required on the final site plan checklist. Deviation from the engineering standards is only allowed with approval from the City Staff and City Engineer.
3. Seventeen (17) complete sets of folded final site plans will be required for final site plan application. It is recommended that the applicant schedule a time to meet with the City before for submitting any plans. All plans must be signed and sealed by a professional engineer registered to practice in the State of Michigan. A complete submittal requires an application and fees.
4. The Zoning Office will forward the plans to all staff and consultants that may have jurisdiction over a certain phase or area of the site for review. The review comments of these other departments will then be incorporated with the reviews from the planning and engineering consultants.
5. Upon receiving all staff comments, the City Zoning Official will assemble all comments and provide them to the Planning Commission for their review. The Planning Commission will recommend that the City Council either approve or deny the plan. When the plan is subsequently approved by the City Council, the Zoning Office will issue an approved copy of the site plan and application. The applicant will take these copies to the Washtenaw County Building Department to obtain a building permit.
6. While approvals may be granted with contingencies on individual phases, partial approvals will not be given. All revisions on all phases must be made before final site plan approval.
7. Final approval will not be given by the City until all required fees and inspection deposits have been submitted.
8. Three (3) copies of a detailed, itemized construction cost estimate for all water main, sanitary sewer, paving and drainage improvements must be submitted to the Zoning Office, and the City Engineer at time of plan submittal. The estimate must be sealed by the Design Engineer. The construction cost estimates will be used to determine the maintenance and guarantee bond amounts as outlined in Section H.

9. For platted subdivisions, a copy of the computed plat will be submitted with all subdivision plans, and all design calculations for the storm, sanitary sewers and water mains.
10. Before issuing final zoning compliance for an occupancy permit, record plans must be reviewed and approved by the City. The record plans must be prepared and certified by a registered engineer. A grading certificate will also be required at this time. Please see the Record Drawing Requirement checklist for record plan requirements (see Appendix).
11. Any necessary state permit applications will not be submitted until final site plan approval is granted by the City Council and the City Engineer.
12. No construction work can begin until all permits including local, county, and state permits, have been secured. Copies of all required permits shall be submitted to the City Engineer and the City Zoning Official.

#### **D. Construction Requirements:**

1. The City Engineer will provide inspection on all public utilities and improvements in the City right-of-way. Wherever possible, inspection will be full-time on public water mains, sanitary sewers, storm sewers, and paving. Inspection will also be provided by the City for sidewalks, approaches, taps to public water main and storm sewers, onsite paving, private storm sewer, and sanitary sewer.

Sanitary sewer taps and water main taps will be inspected by the City of Dexter or the City Engineer. Note that the Washtenaw County Building Department generally inspects the sanitary sewer lead from the main to the building and the water service from the curb stop box to the building.

2. Prior to commencement of work, a minimum of seventy-two (72) hours notice is required to ensure the presence an inspector representing the City. Also, inspection deposits must be submitted to the City prior to commencement of any work.
3. The contractor must obtain all of the required permits before starting construction. A pre-construction meeting should be scheduled at least 3 weeks prior to the anticipated start of construction. Applicants should work with the City to schedule pre-construction meetings at least 2 weeks prior to the meeting itself. The City Engineer will notify all appropriate parties.
4. All public improvements must be field staked under the supervision of the engineer that prepared the plans. Staking must be according to the approved plans.
5. All construction must conform to the current MIOSHA safety standards.

6. At the time of final inspection for all public improvements, the owner or his/her contractor will provide all necessary labor and equipment to allow the City to inspect the system.
7. Generally, one inspector will be assigned to a particular project and will be responsible for that project until its completion. The contractor and the inspector may arrange for day-to-day inspection. Any interruption or moratorium on the flow of work may result in a reassignment of that inspector to another project and require the normal forty eight (48) hour notice before work is resumed.
8. When the project is finished, a certification from the design engineer will be required indicating that all work has been completed according to the approved plans. As-built plans must be accepted by the City prior to a substantial completion letter being granted. Electronic plan submittal requirements per the engineering standards must also be met prior to the issuance of the substantial completion letter.
9. Working hours (including running of any machinery) shall be restricted to Monday through Saturday, 7:00 am to 7:00 pm, or sunup to sundown; whichever is less. Construction operations beyond the time periods previously mentioned shall be permitted only after written approval from the City Manager and/or Superintendent of Public Services.
10. The contractor shall keep public streets clean and free of debris at all times as required by City Standards and the Soil Erosion and Sedimentation Control Permit issued by Washtenaw County.

## **E. Permit Requirements:**

It is the responsibility of the applicant to obtain the appropriate permits for the site. All permits must be obtained and submitted to the City and the City Engineer prior to holding a pre-construction meeting. Permits that may be necessary are listed below.

### **1. Building Permit:**

Before any construction can begin, a building permit must be obtained from the Washtenaw County Building Department. The applicant is required to submit a zoning compliance permit and an approved site plan when making an application for a building permit. This permit will not be issued until plans have been approved by the City of Dexter Council, the City Planner and the City Engineer.

### **2. Soil Erosion and Sediment Control Permit:**

This permit is required prior to the start of any site improvements. Applications are available at the Washtenaw County Department of Environmental Services. A bond will be required in accordance with the Washtenaw County code.

### 3. City Right-of-Way Construction Permit:

Anyone wishing to do work in a City of Dexter right-of-way must apply for and obtain a permit from the City. This includes, but is not limited to, driveway construction and reconstruction. The City Right-of-Way Permit application is available in the Appendix or online at [www.dextermi.gov](http://www.dextermi.gov).

### 4. Michigan Department of Environmental Quality (Water):

Construction of a public water main requires the approval of the City of Dexter and a construction permit from the Michigan Department of Environmental Quality (MDEQ) required under Public Act 399 (1076). The applicant will submit four (4) sets of plans and specifications, signed and sealed by the Michigan registered professional civil engineer responsible for the preparation of the plans and specifications. A permit application must be completed and, along with the water main basis of design for the proposed water main, be submitted by the proprietor's engineer. In addition, a tabulation of water mains consisting of their size, location, type and length will be prepared by the proprietor's engineer and provided on the cover of the plans prior to submitting the plans to the City. The City Engineer will transmit the plans to the MDEQ and request permit approval.

### 5. Michigan Department of Environmental Quality, (Sanitary):

Construction of public sanitary sewer requires approval of the City of Dexter and a construction permit from the MDEQ as required under Part 41 of Act 451, Public Acts of 1994 (formerly Act 98). The proprietor will submit four (4) sets of plans and specifications signed and sealed by the Michigan registered professional engineer responsible for the preparation of said plans and specifications. In addition, a permit application must be completed and, along with design flow computations for the site, proposed sewers, and the existing outfall sewer, be submitted by the proprietor's engineer. A quantity list must be provided on the cover sheet of the approved plans. The City Engineer will transmit plans to the MDEQ and request permit approval.

### 6. Washtenaw County Road Commission, (Roads):

All work within the road right-of-way under the jurisdiction of Washtenaw County requires a permit from the Washtenaw County Road Commission.

### 7. Washtenaw County Water Resources Commissioner, (Storm Drainage).

Connections to County Drains and Sewers:

- a. A Washtenaw County construction permit is required for any connection to a county drain.
- b. Connections to county drains and sewers in Washtenaw County road right-of-way:

- 1) Washtenaw County policy requires that proposed storm sewer connections to existing storm sewers in Washtenaw County right-of-way be maintained by the City of Dexter under a drainage permit issued to the City of Dexter by the Washtenaw County Water Resources Commissioner's Office. The City must provide the county with a council resolution under which the City agrees to accept jurisdiction and maintenance responsibility for the storm sewer connection and authorize a City official to sign the permit.
  - 2) The City of Dexter will require a letter of agreement from the developer stating that the City will be reimbursed for any costs incurred in the maintenance of the storm sewer if it becomes necessary.
8. Michigan Department of Environmental Quality (Wetlands, Inland Lakes and Streams):

It is the developer's responsibility to obtain MDEQ permits as required under Part 301, Inland Lakes and Streams, and Part 303, Wetlands Protection, of Act 451, Public Acts of 1994.

9. Other Permits:

Other agencies from which the developer may need a permit will be designated on the approved plan. These permits are the contractor's responsibility and are required before construction.

Dexter Area Fire Department  
Michigan Department of Transportation  
Michigan Water Resources Commission  
Washtenaw County Health Department  
United States Army Corps of Engineers

## **F. Fees:**

All review fees must be submitted to the Zoning Office before beginning any plan reviews. Likewise, all construction fees must be submitted to the Zoning Office before beginning construction. An Inspection Fee Worksheet is provided in the Appendix. Inspection fees are subject to change depending on the length of time in construction and are included as a reference only. Check with the City Zoning Official for fee updates.

### **Inspection Fees:**

This is a cash amount to be deposited before construction to cover the costs of the City inspection. The deposit is based on the amount of water main, sanitary sewer, storm sewer, paving and public sidewalks that require engineering inspection. An inspection deposit is calculated as provided on the form in the Appendix. All inspection deposits must be submitted to the City prior to the pre-construction meeting. In the case when a pre-construction meeting is not necessary, as

determined by the City, inspection deposits must be made to the City before the approval of the Preliminary Zoning Compliance.

The actual fee for City inspection, which will be supplied on a full-time basis and shall be borne by the applicant, will be set by the City of Dexter and may include an administrative charge if the inspection is contracted to non-City employees.

At the conclusion of the work, if the total costs of the City inspection are less than the amount deposited, the City shall refund the remainder of the deposit. If the amount of the deposit is exhausted before work is concluded, the City shall stop the work, until additional monies are deposited to the City to cover the cost of remaining City inspection.

## **G. Insurance:**

The Contractor, or its subcontractors, shall not commence work until he or she has obtained the insurance required under this paragraph. All coverage shall be with insurance companies licensed and admitted to do business in the State of Michigan. All coverages shall be with insurance carriers acceptable to the City of Dexter.

**1. Workers' Compensation Insurance:** The Contractor, or its subcontractors, shall procure and maintain throughout construction until issuance of Final Certificate of Occupancy by the Washtenaw County Building Department, Workers' Compensation Insurance, including Employers' Liability Coverage, in accordance with all applicable statutes of the State of Michigan.

**2. Commercial General Liability Insurance:** The Contractor, or its subcontractors, shall procure and maintain throughout construction until issuance of Final Certificate of Occupancy by the Washtenaw County Building Department, Commercial General Liability Insurance on an "Occurrence Basis" with limits of liability not less than \$1,000,000 per occurrence and aggregate for Personal Injury,

Bodily Injury, and Property Damage. Coverage shall include the following extensions: (A) Contractual Liability; (B) Products and Completed Operations; (C) Independent Contractor, Coverage; (D) Broad Form General Liability Extensions or equivalent; (E) Deletion of all Explosion, Collapse, and Underground (XCU) Exclusions, if applicable.

**3. Motor Vehicle Liability:** The Contractor, or its subcontractors, shall procure and maintain throughout construction until issuance of Final Certificate of Occupancy by the Washtenaw County Building Department Motor Vehicle Liability Insurance, including Michigan No-Fault Coverages, with limits of liability not less than \$1,000,000 per occurrence, combined single limit, Bodily Injury, and Property Damage. Coverage shall include all owned vehicles, all non-owned vehicles, and all hired vehicles.

4. **Additional Insured:** Commercial General Liability and Motor Vehicle Liability Insurance, as described above, shall include an endorsement stating that the following shall be ***Additional Insureds:*** The City of Dexter, all elected and appointed officials, all employees and volunteers, all boards, commissions, and/or authorities and board members, including employees and volunteers thereof, and the City Engineer and all employees.

5. **Cancellation Notice:** Workers' Compensation Insurance, Commercial General Liability Insurance, and Motor Vehicle Liability Insurance, as described above, shall include an endorsement stating the following: "It is understood and agreed that Thirty (30) days, Ten (10) days for non-payment of premium, Advance Written Notice of Cancellation, Non-Renewal, Reduction, and/or Material Change shall be sent to: City Manager or Construction Project Manager, City of Dexter, 8140 Main Street, Dexter, MI, 48130-1092.

6. **Owners' and Contractors' Protective Liability:** The Contractor shall procure and maintain throughout construction until issuance of Final Certificate of Occupancy by the Washtenaw County Building Department, a separate Owners' and Contractors' Protective Liability Policy with limits of liability not less than \$1,000,000 per occurrence and aggregate for Personal Injury, Bodily Injury, and Property Damage. The City of Dexter shall be "Named Insured" on said coverage. Thirty (30) days Notice of Cancellation shall apply to this policy.

7. If any of the above coverages expire during the term of this contract, the Contractor, or its subcontractors, shall deliver renewal certificates and/or policies to City of Dexter at least ten (10) days prior to the expiration date.

Policies will be made available to the City of Dexter for examination as to their validity and any undesirable exclusion deemed improper by legal opinion rendered to the City regarding it. Underground construction, where applicable, will be specified in the coverage. In the event that the insurance is canceled, operations will stop before the cancellation date and will not resume until evidence is provided that proper insurance is again in effect.

## **H. Bonds:**

Prior to the pre-construction meeting, the applicant shall submit a cash bond to the City of Dexter for the completion of the record plans prior to final acceptance. The guarantee will be posted in an amount equal to 2% of the construction cost, with a minimum deposit of \$1000, to ensure completion of the record plans in a timely manner. If the record plans are not completed within 3 months of the date of substantial completion the bond will be cashed to complete the record drawings.

A Performance Bond in the amount equal to the cost of construction of public improvements and those improvements connecting to the public right-of-way and utilities constructed as part of the project will be required prior to the pre-construction meeting.

Before the City accepts any public improvements, final acceptance of the project will be issued and the applicant will post with the City a two-year Maintenance and Guarantee Bond in the amount equal to one-half of the cost of the construction of public improvements.

The amount of all bonds (cash bond for record plans, Performance Bond and Maintenance and Guarantee Bond) will be based on either the signed contract for work or a sealed engineer's itemized estimate for the work approved by the City Engineer. The contract and/or estimate shall include construction costs for all water main, sanitary sewer, storm sewer, paving and sidewalk work to be completed on site.

## **Engineering Technical Requirements**

### **I. Topography**

#### **A. General:**

1. A complete topographical survey is required for all sites. Existing offsite elevations must be given at a minimum of fifty (50) feet intervals abutting the entire perimeter of the site. Grades will be indicated at all property corners and along all property lines. Onsite, intermittent elevations or defined contours (minimum contour interval of two (2) feet) are required to establish the existing site drainage.
2. All existing conditions will be indicated. Locations and elevations must be given on the following:
  - a. Existing drainage courses.
  - b. Upstream and downstream culverts.
  - c. All utilities including sanitary and storm sewer, water main, gas, telephone, and electrical. Inverts, castings and finished grades are required where applicable.
  - d. Sidewalks.
  - e. Finished grades of all adjacent buildings.
  - f. All easements.
3. A minimum of two (2) NAVD 88 benchmarks are required. All elevations shown on plan must be to NAVD 88.

4. Road topography will extend across the entire site with grades shown on both sides of the street for:
  - a. Property line.
  - b. Ditch centerline.
  - c. Top of bank.
  - d. Edge of shoulder.
  - e. Edge of pavement or top of curb.
  - f. Crown or centerline.
5. Property lines must be indicated by distances and bearings where applicable.
6. Existing and proposed right-of-ways of adjacent roads must be indicated.

## **II. Water Main**

### **A. General:**

1. When a public water main is proposed for construction, the City of Dexter standard water main detail sheets must accompany the plans.
2. A quantity list itemizing all proposed public water main construction must appear on the cover sheet or the first sheet of the plan set.
3. Provide a five and one half (5 ½) feet minimum cover below existing roadway or ground at water main location. The cover provided over the water main shall not exceed eight (8) feet unless otherwise approved by the City and the City Engineer.
4. The installation of pipes placed in casings shall be consistent with the latest revision of AWWA C600. Water main jacking or boring or directional drilling will extend a minimum of ten (10) feet outside the edges of the pavement.

### **B. Sizes and Distribution:**

1. The minimum size water main allowed in the City of Dexter will be eight (8) inches. Six (6) inch mains may be used only for single fire hydrant leads having a maximum length of forty (40) feet. Ten (10) inch mains are not allowed. Maximum dead-end mains are as follows:
  - a. Four hundred and fifty (450) feet for eight (8) inch mains.
  - b. One thousand (1,000) feet for twelve (12) inch mains.

2. Reducers are not allowed to meet the dead-end requirements.
3. A twelve (12) inch water main may be considered as minimum for internal transmission on industrial and multiple sites, commercial, office and institutional, as determined by the Engineer.
4. Looping of mains will be required wherever possible. All mains must end with a gate valve and hydrant or blow-off.
5. No private services will be allowed from a six (6) inch hydrant lead or a water main more than sixteen (16) inches in diameter. Water services and valves shall be located outside of paved areas, and will not be allowed within a driveway.
6. Water main will need to be extended across the entire frontage of the site.
7. Water main will be placed outside the influence of the roadway (6' minimum) within the greenbelt wherever possible.
8. A minimum alignment separation of ten (10) feet must be maintained between any sewer and all water mains.

### **C. Valves:**

1. Gate valve spacing will be regulated by providing the following provisions in case of a breakage:
  - a. No more than thirty (30) single-family units will lose service.
  - b. No more than thirty (30) multiple units will lose service.
  - c. No more than two (2) hydrants will be out of service.
  - d. No more than three (3) valves shall be closed to isolate the break.
  - e. Generally, on line valve spacing will be a maximum of eight hundred (800) feet for water main eight (8) inches in diameter. On water main twelve (12) inches or larger, valves will be spaced not more than one quarter (1/4) mile apart.
2. Gate valves will be located in the greenbelt, not in sidewalks or driveways.
3. All gate valves, except those at hydrants, will be installed in wells. Gate valves at fire hydrants will be installed with a three-piece adjustable valve box.
4. Valves and wells will be placed near the end of all dead end mains for future extension.

5. Plans will show finished grades of all gate well top of castings and hydrants.
6. Connection of new mains to existing mains will be provided with a tapping sleeve, valve and well. In general, disruption in water service will not be allowed for a new connection.

#### **D. Automatic Fire Sprinkler Service Connections:**

1. Hydrants are never to be placed downstream of any check valve used for automatic sprinkler protection.
2. Sprinkler systems are not a substitute for standard requirements for hydrants.
3. Special Requirements for Automatic Sprinkler Fire Protection Systems:
  - a. All sprinkler systems require double-check valves. If the system is treated with additives, then a reduced pressure principal backflow prevention device is required.
  - b. Sprinkler systems directly connected to public water supply mains and also having supplemental supplies of non-potable water, or being located within one thousand (1000) feet of a body of water, shall be isolated from the public water main by an approved backflow prevention device.
  - c. Sprinkler systems directly connected to public water supply mains only, which incorporate an elevated storage tank for fire protection only, shall be isolated from the public water main by double-check valves.
4. Fire Department Connection/Signage: The Fire Department Connection shall be a two and a half (2 ½) inch wye connection. A sign shall also be placed above the connection and shall be approved by the code official before installation. The sign shall be eighteen (18) inches by twelve (12) inches and shall be reflective steel with a white background and two (2) inch red lettering stating "F.D.C.". The signage shall have a red border.
5. Height of Fire Department Connection: The height of the Fire Department connection shall be no less than three (3) feet and no more than four (4) feet. The measurement shall be made from the center of the connection to the finished grade.
6. Fire Department connections caps and covers: All new and existing buildings and structures that have a Fire Department Connection shall be equipped with a threaded cap for protection and a lockable "Knox" type threaded cap shall be installed.

## **E. Hydrants:**

Hydrant location shall be determined as outlined in this section. Additional hydrants may be required depending on the specific use.

### **1. Hydrant Coverage:**

- a. Detached single and two family dwelling units and buildings with less than five thousand (5,000) square feet and moderate to light fire loading require hydrants be placed in the street right-of-way so that no part of the building is more than five hundred (500) feet from a hydrant; or where the Dexter Area Fire Department requires placement of hydrants.
- b. All other developments, buildings and structures: No part of any building or structure shall be more than two hundred and fifty (250) feet from a hydrant, unless approval is given by the Dexter Area Fire Department, and/or the building has internal sprinkling system.
- c. The distance measured for laying hose to an on-site or off-site hydrant shall be measured along the shortest feasible exterior route required for the fire department apparatus to drive from the hydrant to any location of the building. Only public hydrants will be considered for the off-site use.
- d. If off-site hydrants are within fifteen (15) feet of vehicle access on the subject property, the access points must become an easement dedicated to the City of Dexter. If access roads to hydrants cross property lines, fire lanes must be established.

### **2. Hydrant Placing:**

- a. Where near a street intersection, hydrants shall be located within fifteen (15) feet from the intersection street right-of-ways.
- b. Hydrants shall be placed within fifteen (15) feet of the curb line or shoulder. The hydrant shall be placed a minimum distance of three (3) feet from the back of curb and five (5) feet from the edge of pavement. Placing the hydrant three (3) to five (5) feet from the roadway is preferred to allow access by fire department apparatus.
- c. Where a ditch lies between the hydrant and curb or shoulder, a culvert, minimum length twenty (20) feet, shall be installed in the ditch and placed to allow access to the hydrant and the hydrant shall be located within five (5) feet of a hard surface fire lane.
- d. Hydrants shall be located at least fifty (50) feet from the exterior wall of the building unless an alternative location is recommended by the Dexter Area Fire Department.

- e. Fire lanes capable of accepting fire department apparatus shall be provided adjacent to the hydrants.
- f. Hydrants shall be placed no closer than five (5) feet to walls, earth mounds, berms or other such obstructions.
- g. In all cases, hydrants shall be located in highly visible and accessible locations and be consistent with existing patterns when in accordance with these standards.
- h. Hydrants may be placed at low points or high points, as specified by the City and City Engineer, along length of the water main to allow for maintenance purposes.

### **3. Hydrant Connections:**

Hydrants shall have two (2), two and a half (2 ½) inch diameter hose connections and one (1), four (4) inch Storz large diameter hose connection. Four (4) inch Storz connections shall have a locking device to prevent against disconnection. The Storz connection shall have a non-locking cap with a chain or cable connecting the cap to the hydrant. Hydrants will be designed to open in a counterclockwise direction, with five and one quarter (5 ¼) inch valve opening and six (6) inch diameter inlet. Hydrants shall face the centerline of the road with nut type caps with chains. Inside diameter of all connections will be National Standard Thread pattern. Hydrants must have a breakaway flange and be painted red.

### **4. Hydrant Protection:**

Where a hydrant is placed in an area of vehicular traffic, four (4) inch diameter steel pipe bollards filled concrete shall be provided to protect hydrant from damage. The arrangement of pipe bollards and/or curbing in lieu of pipe bollards is subject to the recommendation and requirements of the Dexter Area Fire Department.

### **5. Hydrant Leads:**

All hydrant leads shall not be less than six (6) inches in diameter. All hydrant leads shall be valved.

### **6. Hydrant Height:**

All hydrants shall be no less than eighteen (18) inches and no more than thirty (30) inches above finished ground. The measurement shall be made from the center of the pumper outlet to the finished grade.

## **7. Hydrant Inspection, Testing and Maintenance:**

Standards adopted by the American Water Works Association (AWWA) Manual, latest edition will be used for inspection, testing and maintenance.

## **8. Existing Hydrants:**

Existing hydrants on public streets may be considered when locating additional hydrants to meet the standards. Storz connections shall be provided on existing hydrants. Existing hydrants on adjacent properties shall not be considered unless recommended by the Dexter Area Fire Department.

## **9. Internal Sprinkling Systems:**

Where an internal sprinkling system will be installed, an eight (8) inch diameter ductile iron water main must be provided to a hydrant within one hundred (100) feet of the Fire Department connection or where recommended by the Dexter Area Fire Department.

## **10. Water Supply:**

Determining water supplies for firefighting purposes shall be determined by the Insurance Service Organization (ISO) formula ( $F=18 C (A)^{1/2}$ ).

## **F. Construction:**

Building permits will not be issued for wood frame construction above the foundation for any development before the required mains and hydrants are put into service. Adequate access for firefighting equipment must also be provided. No occupancy will be allowed without the required mains, hydrants, and sprinklers in active service.

## **G. Easements:**

All public water mains must be in an easement or public right-of-way. Standard easement forms are available at the City Zoning Office. The minimum easement width will be twelve (12) feet. The easement must be dedicated before the City accepts the system.

## **H. Joints:**

Approved restraint systems shall be provided at all bends of eleven and one quarter ( $11\frac{1}{4}$ ) degrees or greater, behind tee outlets, at hydrant shoes, at plugs or caps, where necessary to prevent lateral movement of the pipe.

When joint restraints cannot be provided as shown on the standard details, concrete thrust blocks, as approved by the City Engineer, will be provided. Thrust blocks will

bear against undisturbed earth in all instances and will have sufficient bearing area to develop the full resultant axial thrust of the pipe at test pressure. Thrust blocks will be made of three thousand (3000) psi concrete and of adequate size and shape to resist all design working and surge pressures to which the main will be subjected. Harnessed joints and steel reinforced concrete anchorage will be required on pipes larger than sixteen (16) inches in diameter.

### **I. Meters:**

1. Water Meters will be furnished by the City of Dexter and shall be installed by the user under the supervision of the City. The cost of one meter is included in the tap-in fee; additional meters shall be paid for by the user prior to installation and shall become City property upon installation. The cost of any meter larger than one and one half (1 ½) inches shall be paid for by the user prior to installation and shall become City property upon installation. Master meters for main line metering of industrial and commercial complexes shall be subject to City approval.
2. Authorization must be obtained from the City of Dexter to allow the use of a master meter in lieu of individual meters. Metering systems shall be reviewed on an individual basis and shall include such auxiliary equipment as deemed necessary by the City of Dexter. The meter shall be installed in an approved vault or an approved heated and ventilated above-ground enclosure.

### **J. Testing and Sterilization:**

(See Construction Specifications)

### **K. Back Flow Prevention:**

Suitable back flow prevention devices shall be used as noted in the Cross Connection Rules Manual by the Michigan Department of Environmental Quality dated October 2008. The back flow prevention device shall be visible from above ground, unless otherwise approved by the City.

### **L. Materials:**

1. Water Mains:
  - a. Public water main shall be ductile iron water main. Ductile iron pipe will be manufactured according to the latest revisions of ANSI A21.51 and AWWA C-151. Pipe will be standard wall thickness Class 54 for pipe diameters of four (4) inches through sixteen (16) inches inclusive.
  - b. Pipe will be double cement lined and seal coated with approved bituminous seal coat according to the latest revisions of AWWA Specifications C-104 and ANSI Standard A21.4.

c. Pipe material and details for water main greater than sixteen (16) inches in diameter will be subject to the City Engineer.

d. All water main must contain tracer wire.

2. Joints:

a. Joints for ductile iron pipe will be the push on type conforming to ANSI A21.11 and AWWA C-111 standard specification. Mechanical or flanged joints will be allowed for special applications, subject to the approval of the City Engineer and the City Public Services Superintendent. Sealing gaskets, retainer glands and lubricants for joints will meet the pipe manufacturer's specifications.

b. For connection to materials not specified herein, the contractor will submit shop drawings of such pipe and fittings to the City Engineer and the City Public Services Superintendent for approval.

3. Fire Hydrants:

a. Fire hydrants will be East Jordan Iron Works model 5BR, Waterous or an approved equal conforming to AWWA C-502 improved hydrant specifications.

b. All hydrants will be constructed with a companion gate valve in a three-piece, adjustable cast-iron valve box.

4. Gate Valves and Wells:

a. Gate valves for sizes six (6) inches through sixteen (16) inches in diameter, will be iron in body, fully bronze mounted, resilient wedge with non-rising stems opening counterclockwise with a two (2) inch square operating nut. Valves will conform to AWWA C-500, latest revision. Valves will be designed for a working pressure of 200 psi and a test pressure of four hundred (400) pounds per square inch (psi). The valves will be ordered with inlet and outlet connections compatible to the water pipe joint used on the system.

b. All gate wells will be concentric constructed of precast reinforced concrete sections according to City standard details. Kor-n-Seal boot, or approved equal, to be placed when pipes extend through the gate well.

c. Gate well floors will be of three thousand five hundred (3500) psi reinforced concrete with at least six (6) inches protruding from the periphery of the well wall. The floor will be a minimum of six (6) inches thick.

d. Gate well covers and frames will be East Jordan Iron Works #1040 with Type "A" covers, or approved equal. Covers will have the word "WATER SUPPLY SYSTEM" in raised letters spaced in from the periphery of the cover.

- e. Gate well valves will be at least six (6) inches above the floor or gate well and supported with either brick or formed concrete.
- f. Heat shrinkable manhole wraps to be placed on all gate wells.
- g. Tapping sleeves shall be stainless steel meeting applicable AWWA C223 standards and be NSF 61 certified.

5. Water Services:

- a. Water service line one (1) inch through two (2) inches in diameter will be domestic type "K" copper. All services larger than two (2) inches will be Class 54 ductile iron pipe.
- b. A minimum size of one (1) inch will be required for water service lines. Other allowable sizes are one and one-half (1-½) inches, two (2) inches, three (3) inches, four (4) inches and six (6) inches.
- c. Water service lines two (2) inches in diameter and smaller will generally be installed by the City of Dexter Utilities Department. Water service lines larger than two (2) inches in diameter will be installed by an outside agency. Water service lines installed by an outside agency must have inspection and approval from the City.

6. Fittings:

Fittings will have mechanical joints conforming to ANSI-A21.10 and AWWA C-110 standard specifications for ductile iron fittings. Push on fittings will only be allowed with the approval of the City and City Engineer.

7. Corporation Stop:

Corporation stops will conform to AWWA C-800 standard specifications. They will only be one (1) inch Ford with compression fittings with a set screw, or approved equal. Corporations larger than 1 inch will be as called for on the drawings.

Ball valves shall conform to AWWA C-507 standard specifications, and will be brass compression fittings with set screw.

Curb stop boxes will be Ford or approved equal conforming to AWWA C-110 standard specifications. They will have an arch pattern base for 1-inch or 2-inch curb valves with a one-piece lid.

### **III. Sanitary Sewer**

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#### **A. General:**

1. Public sanitary sewers are required when two or more connections are made to the same sewer. City approval will be required for private service serving more than one building.
2. The extension of the sanitary sewers will be required across the entire frontage of the site.
3. All construction will conform to the current City of Dexter Engineering Standards Manual.
4. Where public sewer construction is proposed, the City of Dexter standard sanitary sewer detail sheets must accompany the plans.
5. A quantity summary itemizing all proposed public sanitary sewer construction and the basis of design must appear on the cover sheet or the first sheet of the plan set. Service Lead Schedule shall also be provided in the plan set.

#### **B. Design:**

1. Sewer design flow computations will be submitted to the City Engineer for approval with a map of the area to be serviced. Developmental phases, present and future, with acreage and offsite areas contributing, will be shown with the number of lots or units included. A permit application for a sanitary sewer construction permit as required by Part 41 of Act 451, Public Acts of 1994 (formerly Act 98) must be completed by the design engineer and submitted for review and approval by the City Engineer for submittal to the Michigan Department of Environmental Quality.
2. Sewer capacities (lateral and trunk) will be based upon one hundred (100) gallons per capita per day multiplied by the appropriate peaking factor. The sanitary sewer shall be designed in accordance with the Recommended Standards for Wastewater Facilities (RSWF), also known as 10 States Standards.
3. For residential developments of single homes, design population will be at least three and one-half (3.5) persons per prospective building. In developments for housing of other types, institutions, commercial, and industrial developments, studies will be conducted to establish equivalent population values. Existing and proposed Residential Equivalent Units (REU) must be calculated per the City's latest Table of Connection Unit Factors and provided on the plans for City review and approval.

4. Any new development that proposes to discharge wastewater in excess of those limits as defined in the Sewer Service Ordinance of the City of Dexter, Code of Ordinances shall provide a detailed breakdown of the wastewater constituents to the City that includes the amount and loadings for the various components. At a minimum, the developer shall provide BOD, CBOD, Suspended Solids, Phosphorus, Ammonia, and pH. Additional materials may be requested by the City depending upon the developer's assigned user classification.
5. Public sanitary sewers will be eight (8) inches in diameter minimum.
6. Minimum design velocity for sanitary sewers will be two (2) feet per second with pipe flowing full. The eight tenths (0.8) depth flow line of sewers will be matched at manholes when changing sizes of sewers.
7. Flows shall be compared with existing downstream sewer capacity to assure that there is enough capacity available for proposed development.
8. Maximum design velocity for sanitary sewers will be ten (10) feet per second with the pipe flowing full

### **C. Sewerage:**

Down spouts, weep tile, footing drains, sump pump discharges or any other conduit that carries storm or ground water will not be allowed to discharge into the building sewer or lateral sewer.

### **D. Grade:**

1. The following table represents the minimum and maximum grade for public sanitary sewers. Note that these are minimum and maximum requirements and will generally be used only when topography requires it.

<b>Size</b>	<b>Minimum Grade</b>	<b>Maximum Grade</b>
8	0.40%	8.0%
10	0.30%	6.2%
12	0.22%	6.0%
15	0.16%	3.6%
18	0.12%	2.8%
21	0.10%	2.2%

2. All upstream dead end sewers will have a minimum last run grade of one (1) percent.

### **E. Manholes:**

1. Manholes will generally be placed at three hundred (300) foot intervals, at every change of grade, direction, and pipe size and at each junction of sewers. The maximum distance between manholes will be four hundred (400) feet for sewers, thirty six (36) inches in diameter and smaller.
2. Whenever there is an increase in pipe size, the grade will match at a line eight tenths (0.8) of the diameters above the inverts.
3. An allowance of one tenth (0.10)-foot in grade will be made for loss of head through a manhole of deflections of thirty (30) degrees or more.
4. External drop connections are required where the invert of the outlet pipe is eighteen (18) inches or more below the inlet pipe invert. Internal drop connections will not be permitted.
5. Chimney section must be sealed with a heat shrinkable manhole wrap.

### **F. Depth of Sewers:**

1. Minimum depth of cover to top of pipe will be four (4) feet.
2. The minimum depth of invert below finish grade of the building to be served will be ten (10) feet unless otherwise approved. In addition, the sewer service is to be a minimum of eight and one half (8-½) feet below top of curb, unless otherwise approved. Deep setbacks or unusual conditions may require more depth.
3. The maximum depth to invert of any sanitary sewer will not exceed the depth recommended by the manufacturer for each size and class of pipe
4. Pipe will be laid on a carefully prepared Class B bed minimum consisting of porous sand extending from at least four (4) inches below the pipe to at least twelve (12) inches above the elevation of the top of pipe. Bedding shall be compacted to 95 percent of maximum unit weight.

### **G. Location:**

1. Sanitary sewers will be located to provide unrestricted access for maintenance and inspection. A minimum alignment separation of ten (10) feet must be maintained between the sewer and all water mains. The water main and sanitary sewer will be on opposite sides of the street.
2. Sanitary manholes shall be placed in the greenbelt.
3. All public sewers must be in a public right-of-way or an easement. Standard

Easement Forms are available at the City Zoning Office. The easement size will vary individually as required for maintenance and access. The minimum sanitary sewer easement will be twenty (20) feet. The easement must be dedicated before the City can accept the system for continuous maintenance and service.

4. A minimum alignment separation of ten (10) feet must be maintained between the sewer and all water mains.

## **H. Leads:**

1. Service leads will be four (4) inches in diameter with a minimum slope of two (2) percent or six (6) inches in diameter with a minimum slope of one (1) percent.
2. Private sanitary sewer leads of excessive length, although not a public sewer may require inspection and testing. Each site will be considered individually by the City.
3. Sanitary sewer leads shall be located outside of paved areas, and will not be allowed within a driveway. Maintain a minimum separation of 10 feet from the water service.

## **I. Profile:**

1. The following information will be shown on the sanitary sewer profile:
  - a. Length of run between manholes.
  - b. Type and class of pipe between manholes.
  - c. Size and grade of pipe between manholes.
  - d. Top of casting and invert of all manholes and sewers at manholes.
  - e. Existing and proposed ground elevation along the route of the sewer.
  - f. Progressive numbering system on structures.
  - g. All utility crossings. Indicate porous backfill to twelve (12) inches above higher utility.
  - h. Special backfill areas, i.e. compacted sand backfill.
  - i. Provisions for infiltration testing.
  - j. Adjacent existing or proposed utilities plotted where parallel and may conflict with sewer leads.
  - k. All existing sewer inverts must be field measured and so noted on the plans.

## **J. Materials:**

1. Sanitary sewer pipe will conform to the following current American Society for Testing and Materials Specifications. Allowed materials for public sewer pipe are as follows:
  - a. Reinforced Concrete Sewer Pipe, ASTM Designation: C76. Class IV minimum.

- b. Composite ABS plastic, PVC and Perlite concrete truss pipe material as manufactured by Metal Products Division of Armco Steel Corporation, or equal, will conform to the requirements of the latest revision of ASTM D-2680-74.
  - c. PVC pipe and fittings will conform to requirements of the latest revision ASTM D-3034 (SDR 26). Deflection of pipe will be limited to a maximum of five (5) percent.
2. Pipe joints will conform to the following requirements depending on the allowable type of pipe used:
- a. All joint will be premium gasket joints.
  - b. Modified Grooved Tongue (MGT) joints for pipe will have a rubber gasket snapped into a groove cast into the tongue. The modified groove or bell end of the pipe will be made smooth and will not have more than a three (3) degree slope for sizes eight (8) inches through twenty (24) inches or a two (2) degree slope for sizes twenty seven (27) inches through one hundred and eight (108) inches, tapered to fit the rubber gasket to tolerances as determined by the gasket manufacturer. MGT joints will be lubricated and coupled according to the pipe manufacturer's printed instructions.
  - c. Rubber gasket joints for pipe will follow the Tentative Specification for "Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible, Watertight, Rubber Type Gaskets," ASTM Designation: C-443, latest revision. The rubber gasket joints will be lubricated and coupled according to the pipe manufacturer's printed instructions.
  - d. Joints for PVC pipe will be the push on type. Push on type joints will conform to ASTM Specification D-3212, latest revision.
3. Manholes will be constructed of precast reinforced concrete sections according to the City of Dexter standard details.
- a. Precast reinforced concrete manhole sections will conform to requirements of the American Society for Testing and Materials, "Standard Specification for Precast Reinforced Concrete Manhole Sections" ASTM Designation: C478, latest revision thereof.
  - b. Precast manhole joints will be MGT with rubber gaskets as described in Section J, Part 2.
  - c. Manhole steps will be reinforced polypropylene plastic #PS-2-PFS or approved equal.
  - d. Where manholes are outside pavements and sidewalks, final grade adjustments will be made with precast concrete grade adjustment rings. Brick construction will not be allowed except in paved surfaces. Grade rings will be a minimum of three (3) inches thick and reinforced with two (2) full circles of three sixteenths (3/16) of an inch diameter steel reinforcing wire. Manhole casting frame and concrete adjustments rings will be secured to the precast cone section with a minimum of four (4) five eighths (5/8) inches in diameter cadmium coated threaded studs or bolts. The maximum allowable grade adjustments

using grade rings shall be fifteen (15) inches. All joints in the assembly will be sealed with rubber "O" ring gaskets.

- e. Final grade adjustment for manholes in pavements and sidewalks will be made with brick and mortar. A maximum of three (3) courses of brick will be placed on top of the precast cone section.
- f. Manhole covers and frames will be EJIW #1040 with Type "A" cover or approved equal. Covers will be cast with the words "SANITARY SEWER SYSTEM" in raised letters spaced in from the periphery of the cover.
- g. Special approved wet area manholes with precast rubber gasket type pipe fittings and lock down rubber gasket type manhole covers such as EJIW #1040 ZPT, or equal, will be required in areas of high ground water table and where manholes are in or next to drainage ditches, low areas and floodplains. Details of this type manhole are included in the standard plan sheets.
- h. All sanitary manholes shall have a heat shrinkable manhole wrap placed from the top of the frame casting base over the adjustment rings and over at least half of the transition cone section of the manhole chimney.

### **K. Infiltration:**

Infiltration rates for all sanitary sewers will not exceed one hundred (100) gallons per inch diameter per mile of pipe per twenty-four (24) hours. Infiltration tests will comply with the current testing standards and requirements of the City of Dexter. An exfiltration test will be used instead of an air test when concrete pipe is used for sanitary sewer. Where groundwater is greater than two (2) feet over the top of the pipe, an infiltration test may be used instead of air testing.

### **L. Inverted Siphons:**

In general, sanitary sewer siphons will be avoided and will only be accepted when no other feasible alternative exists and where there will be sufficient flow in the sewer so that maintenance will be held to a minimum. Pipes for inverted siphons will be a minimum of six (6) inches in diameter. There will be a minimum of two (2) pipes for each inverted siphon and a minimum velocity of three (3) feet per second.

### **M. Pump Stations:**

- 1. There will be a minimum of two (2) pumps in a pumping station. The minimum size of discharge lines will provide adequate cleaning velocities and will conform to Michigan Department of Environmental Quality requirements.
- 2. All pumping station plans will be considered separately.
- 3. Provisions must be included for auxiliary power source and telemetered alarm system.
- 4. Pipe for force mains will be designed to withstand both internal pressures and

external trench and live loads. Design computations will be submitted by the proprietor's engineer for review and approval.

5. The pipe will be ductile iron, or PVC pressure pipe. Ductile iron pipe will be cement lined. Joints and fittings will be equal to the requirements for pressure pipe used in the domestic water distribution system. Force mains will be pressure tested for water tightness to a test pressure equal to twice the total system head, but no less than fifty (50) psi held for a minimum one (1) hour period. Leakage will be limited to not more than twenty five (25) gallons per inch diameter per mile or pipe per twenty four (24) hours at required test pressure.

## **N. Building Sewers:**

1. Building Sewers included with Sewer Construction:

Unless otherwise approved due to exceptional circumstances, construction of the building sewer, from public sewer to property line for each fronting parcel that the sewer is designed to serve, will be included with construction of each sanitary sewer. Building sewers will extend a minimum of ten (10) feet beyond the property line.

2. Wyes, Tees and Risers:

In sanitary sewers, where construction of building sewers to the property line is not required, a wye branch or tee inlet will be installed for each lot or building site. Where cover over sanitary sewer to finished grade is more than ten (10) feet, risers will be installed from wyes or tees to an elevation ten (10) feet below finished grade. Location of the wye or tee will be marked from the downstream manhole on the record sewer plans prepared. Where the water table is high, the riser will end at a depth of one (1) foot above the water table. When house leads are to be cut into an existing sanitary sewer, a tap will be made with the use of an approved saddle.

3. Size and Material of Sanitary Sewer Service Leads:

Ordinary house connections will be either four (4) inches or six (6) inches in diameter and will be constructed of ABS plastic solid wall pipe ASTM D-2751, latest revisions, or PVC pipe conforming to the requirements of the latest revision ASTM D-3034 (SDR 26). Larger building sewers may be constructed of materials permitted for sanitary sewers under the same conditions of depth.

Joints in building sewers, including fittings and stoppers for wyes, tees, risers and building sewer leads, will conform to the requirements of these specifications as stated in Section J of this chapter.

For maintenance, cleanouts shall be placed at locations where the service leads change direction.

4. Grade:

The minimum grade of building sewers will two (2) percent for four (4) inch sewers, and one (1) percent for six (6) inch sewers.

## **IV. Storm Sewer and Storm Water Treatment**

### **A. General:**

1. The City of Dexter endorses the rules of the Washtenaw County Water Resources Commissioner's Office and encourages the use of their "Rules and Guidelines: Procedures and Design Criteria for Storm Water Management Systems" wherever possible. The City also recognizes that use of their design criteria may not practical under all circumstances. Certain areas of the City, such as the Central Business District, do not offer the same opportunities for storm water management as in other areas. This decision will be made by the City Administration and/or their consultants on a case-by-case analysis. The applicant is encouraged to address this issue with the City Administration at the pre-application conference.
2. When storm sewer construction is proposed, the City of Dexter standard storm sewer detail sheets must accompany the plans.
3. Underground drainage facilities will generally be required. All runoff onsite must be accommodated and discharged in a controlled manner. The minimum onsite pipe size is twelve (12) inches. All public systems will have a minimum pipe size of twelve (12) inches.
4. Compacted sand backfill consisting of MDOT Class II granular material compacted to 95% of maximum unit weight will be required in all trenches within a 1:1 influence of the roadway, pavement, sidewalk, bike path, etc.
5. Sump pump discharge must be directed into the storm sewer via an enclosed system. As a minimum, a four (4) inch pipe will be used and will be allowed to discharge unrestricted.
6. Depth of sewer: The minimum allowable coverage over pipe is three (3) feet. Low head structures shall be utilized in locations where the cover over the top of the pipe is four (4) feet or less.
7. Washtenaw County Road Commission requires a maintenance agreement for connection to storm sewers in County roads.
8. Any work proposed to a County drain, including outletting to a County drain, will require review and approval from the Washtenaw County Water Resources Commissioner.

## **B. Structure:**

1. Inlets at the upstream end of the system will be a minimum of twenty four (24) inches in diameter. Catch basins with an inlet pipe and all manholes will be forty eight (48) inches in diameter at a minimum. All structures must be a minimum of four (4) feet deep unless low head structures are utilized.
2. The first structure upstream from a public system within the confines of the private development will be a minimum forty-eight (48) inches in diameter and have a twenty four (24)-inch sump.
3. Manholes will be at:
  - a. All changes in alignment.
  - b. Points where the sewer changes size.
  - c. Points where the grade changes.
  - d. Junction of sewer lines, including connection from catch basins.
4. The maximum distance between manholes will be three hundred (300) feet for sewers thirty (30) inches in diameter and smaller; four hundred (400) feet for sewers thirty six (36) inches in diameter; and spacing for diameters greater than thirty six (36) inches will be considered individually.
5. Catch basins will be located as follows:
  - a. At all low points.
  - b. Five (5) feet away from the end of the intersection radius. No more than one hundred fifty (150) feet of street drainage will be allowed to flow around a corner.
  - c. A relief basin will be required at the highest end of the intersection radius where drainage is required to cross an intersection longitudinally.
  - d. At intermediate points along the street, drainage will be allowed to flow six hundred (600) feet maximum. The maximum street drainage into a basin is seven hundred (700) feet from two directions.
  - e. Where longitudinal grade exceeds one thousand (1000) feet, a double inlet structure will be required at the low point as necessary.
  - f. Head walls will be required where storm sewers enter open ditches or county drains.

## **C. Storm Sewer Design:**

1. Storm sewers will be designed using the Manning Equation for pipes flowing full. Runoff will be determined using the Rational Method for a ten (10) year storm event with an intensity formula of  $I = 175 / (T+25)$ . The initial time of concentration (T) will generally be twenty (20) minutes maximum.

2. Storm sewer design computations must be submitted for review. The velocity will be a minimum of two and one half (2-½) feet per second and will not exceed ten (10) feet per second. The minimum and maximum gradients in percent slope for each size pipe listed will be as follows:

Pipe Size (inches)	Minimum Grade %	Maximum Grade %
12 inches	0.34	4.80
15 inches	0.26	3.60
18 inches	0.20	2.60
21 inches	0.16	2.20
24 inches	0.14	1.80
27 inches	0.12	1.50
30 inches	0.10	1.30
36 inches	0.08	1.00
42 inches	0.06	0.80
48 inches	0.05	0.70

3. The hydraulic gradient must be maintained within the pipe wherever possible and will be shown on the storm sewer profile. The gradient must be a minimum of two (2) feet below the top of all inlet structures.
4. Composite runoff coefficient can be determined for each individual drainage area and calculations for each drainage area must be submitted as part of the design computations. Composite coefficient design is based on the sum of the percentages of each drainage area covered by impervious and pervious areas multiplied by the respective coefficient, listed below.
  - a. Impervious (Improved) Areas:  $C = 0.95$
  - b. Pervious (Unimproved) Areas:  $C = 0.20$
5. Along with the storm sewer design computations, the design engineer must submit a storm district map showing all drainage districts within the development. The district limits must be overlaid on a proposed grading plan for the site. The design computation sheet will be sealed by the registered engineer who supervised the computations.
6. All upstream drainage must be accommodated onsite. Allowances for upstream area must be based on ultimate improvements and runoff.

7. Discharge must not be diverted onto abutting properties. The outlet must follow the existing natural drainage courses in the area.
8. Underdrains must connect to storm structures.
9. Footing drains will be discharged by sump pumps connected by underground piping (4-inch pipe minimum) to a storm sewer.

For new subdivisions and site condominiums, storm sewers will be extended where required to provide an outlet for sump pump lines for all lots. Exceptions to this rule may be allowed where soils and hydrology studies show that sump pumps discharging to the ground surface will not cause a drainage problem for the prospective homeowner or the adjacent lot owners.

Sump pump discharge lines will not discharge directly to street gutters.

#### **D. Plan and Profile:**

1. All public storm sewers must be shown in profile. For developments larger than one acre the private storm sewer must also be shown in profile.
2. The following must be shown in profile:
  - a. Length of run between manholes and catch basins.
  - b. Type and class of pipe between manholes and catch basins.
  - c. Size and grade of sewer between manholes and catch basins.
  - d. Top of casting elevations.
  - e. Inverts of all pipes at manholes.
  - f. Proposed and existing ground elevations along the route of the sewer.
  - g. Progressive numbering system on all manholes and catch basins.
  - h. All utility crossings.
  - i. Special backfill areas, i.e. compacted sand backfill.
  - j. Hydraulic gradient for the 10-year design storm.

#### **E. Taps:**

Connections must be made at manholes. Blind taps are not allowed.

#### **F. Public Storm Sewer:**

1. All public storm sewers must be in a public right-of-way or an easement. Standard easement forms are available at the City Zoning Official. The easement size will vary as required for maintenance and access. The minimum storm sewer easement will be 12 feet. The easement will need to be dedicated before the City can accept the system for continuous maintenance and service.

2. Any storm sewer that accepts runoff from abutting property or public right-of-way must be placed in a minimum twelve (12) foot storm sewer easement.

## **G. Materials:**

1. Public storm sewer pipe will conform to the current ASTM "Standard Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe," ASTM C-76 for circular pipe, or C-507 for horizontal elliptical pipe, latest revision. Reinforced concrete pipe shall be a minimum grade of CL-IV. Public sewer shall be reinforced concrete pipe. If other materials are proposed for use, the proprietor will furnish the load carrying design analysis for the pipe for the proposed depth conditions. Pipe joints will conform to one of the following requirements:
  - a. Modified Grooved Tongue (MGT) pipe will have a rubber gasket snapped into a groove cast into the tongue. The modified groove or bell end of the pipe will be made smooth and will have not over a three and one half (3 ½) degree slope for sizes twelve (12) inch to twenty four (24) inches, or a two (2) degree slope for sizes twenty seven (27) inches to one hundred eight (108) inches, tapered to fit the rubber gasket to tolerances as determined by the gasket manufacturer. MGT joints will be lubricated and coupled according to the pipe manufacturer's printed instructions.
  - b. Rubber gasket joints will follow the "Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets," ASTM Designation: C-443, latest revision. Rubber gasket joints will be lubricated and coupled according to the pipe manufacturer's printed instructions.
2. Private storm sewer pipe will conform to reinforced concrete pipe as described in the public storm sewer section. Alternatively, Smooth-Lined Corrugated Polyethylene Pipe (CPE) may be utilized. Pipe and required fittings shall conform to the requirements of AASHTO M 294, for Type S. Provide Corrugated Polyvinyl Chloride Pipe (PVC) and required fittings meeting the requirements of AASHTO 304. The Engineer will test CPV in accordance with MTM 728.
  - a. If providing a separate fitting or coupling to ensure a watertight joint in corrugated plastic pipe culverts and sewers, use non-corrugated, solid sleeve, fabricated from Polyethylene (PE) or Polyvinyl Chloride (PVC) with a gasket meeting the requirements of subsection 909.03 on both sides of the joint. Do not use split collar couplers.
  - b. Ensure a pipe indentation in each sleeve in the center to ensure positioning of the pipe sections in the field. Factory install sleeves on one end of the pipe sections and place a removable protective material over the exposed gaskets. Lubricate gaskets and sleeves before insertion, as required by the manufacturers.

3. Manholes will be constructed of precast reinforced concrete sections according to the City of Dexter standard details. Concrete block will only be allowed in special circumstances with approval from the City and City Engineer.
  - a. Precast reinforced concrete manhole sections will follow the requirements of the ASTM "Standard Specification for Precast Reinforced Concrete Manhole Sections," ASTM Designation C-478, latest revision. Wall thicknesses will depend on depth and will be subject to the approval of the City Engineer.
  - b. Brick for casting adjustment, or concrete block for manhole, inlet, and catch basin construction will conform to the requirements of the Michigan Department of Transportation "Standard Specifications for Construction," Section 403.03, latest revision. Wall thicknesses will depend on depth and will be subject to the approval of the City Engineer.
  - c. Precast manhole joints will be as described in Section I, Item 2 of this chapter.
  - d. A maximum height of eighteen (18) inches is allowed for total chimney height. Chimney is defined as top of precast structure to top of casting.
  - e. Manhole covers and frames will be EJIW #1040 with Type "B" cover or approved equal.
  - f. Chimneys must be wrapped in heat shrinkable manhole wrap.
4. Catch Basins:
  - a. Catch basins will be constructed of precast reinforced concrete manhole sections, according to the City of Dexter standard details.
  - b. Chimneys must be wrapped in heat shrinkable manhole wrap.
  - c. Catch basin and inlet frame and covers will be EJIW No. 5080 or equivalent when in pavement edge or gutter line.
  - d. Catch basin and inlet frame and covers will be EJIW No. 1040 Type M cover or equivalent when in paved areas other than edge gutter line.
  - e. Catch basin and inlet frame and covers will be EJIW No. 1040 with Type "N" cover or equivalent when in yard areas.
  - f. All storm structure covers shall be inscribed with the message, "Dump no Waste, Drains to Waterways"

## **H. Storm Water Treatment:**

1. Storm water treatment must be provided to manage the first flush volume, bankfull volume and 100-year reoccurrence interval event. In addition, infiltration must be provided onsite for either 1) the entire first flush volume or 2) the difference between the pre-settlement bankfull volume and post-development bankfull volume, whichever is greater.
2. Storm water treatment must be provided onsite. Acceptable means of storm water treatment can be achieved through the use of Best Management Practices, such as bioretention systems, porous pavement, infiltration trenches, detention/retention systems, etc. Any combination these options may be used to achieve the required storm water treatment.

### 3. Design:

a. Design shall follow the requirements of the Washtenaw County Water Resources Commissioner.

b. First flush volume to be calculated using the Rational Method.

$$V_{ff} = 1815 \times A \times C$$

c. The required storage volume will be equal to, or greater than, the volume computed for a one hundred (100) year frequency storm using the formulas provided below:

#### 1. Definition of terms:

$A$  = Contributing drainage area (acre)

$C$  = Coefficient of Imperviousness

$Q_o$  = Maximum allowable outflow per acre imperviousness (cfs/acre)

$Q_a$  = Maximum allowable discharge rate

$T$  = Storage time, defined as the interval of time at the instant storage begins until peak storage is attained (min.)

$V_s$  = Maximum volume of water stored in the detention basin per acre imperviousness (cft/acre)

$V_t$  = Maximum volume of water stored in the detention basin (cft)

#### 2) Storage volume formulas for gravity orifice flow (variable rate discharge):

$$V_s = \frac{16,500 T - 40 Q_o T}{T + 25}$$

$$\text{Where } T = -25 + \sqrt{(10,312.5/Q_o)}$$

$$\text{And } Q_o = Q_a / (A \times C)$$

$$V_t = V_s \times A \times C$$

#### 3) Storage volume formulas for pumped discharge (constant rate discharge):

$$V_s = \frac{16,500 T - 60 Q_o T}{T + 25}$$

$$\text{Where } T = -25 + \sqrt{(6875/Q_o)}$$

And  $Q_o = Q_a / (A \times C)$

$V_t = V_s \times A \times C$

- c. The proposed storage volume on the site will be based on the total amount of contributing acreage, including all off site areas that flow onto the property.

#### 4. Detention/Retention Systems:

- a. Sufficient detention volume must be provided so that the allowable discharge rate during the design storm is not exceeded. Discharge must be throttled to a restricted rate. The maximum allowable discharge rate is as follows:

- 1) Fifteen one hundredths (0.15) cubic feet per second per acre being drained.

$$Q_a = 0.15 \times A$$

- 2) Discharge approved by agency having jurisdiction over outlet, i.e., Washtenaw County Water Resources Commissioner's Office or county road commission (approval must be submitted).
- 3) Allowable flows designed into the outlet (previous calculations must be submitted).
- 4) Off-site flow into the Dexter Business and Research Park storm sewer system will be restricted to the following formula:

$$Q_a = \frac{12.5 \times A}{352}$$

- b. The detention basin must be constructed to drain entirely unless designed to retain a permanent water level that conforms to the aesthetics of a landscape plan relating to the surrounding landscape.
- c. Any volume of water provided below invert of the gravity outfall pipe will not be considered as detention.

- 1) At a minimum, the volume of the permanent pool should be at least 2.5 times the first flush volume.

$$V_p = 4540 \times A \times C$$

- 2) In general, depth of the permanent pool should be varied and average between three (3) feet and six (6) feet.
- 3) A marsh fringe should be established near the inlet and around at least fifty (50) percent of the perimeter of the permanent pool.
- 4) A shelf, a minimum of four (4) feet wide at a depth of one (1) foot, will surround the interior of the perimeter to provide suitable conditions for the establishment of aquatic vegetation and to reduce the potential safety hazard to the public.

- d. The outfall from detention basins will be designed to operate by gravity. Where this is not possible, mechanical pumping is permissible, and such facilities are subject to the review and approval by the City's Engineer.

Mechanical lift stations for detention basin discharge will be designed with a minimum of two (2) pumps, each rated at the allowable discharge rate and provided with an automatic control system to operate the pumps on alternating periodic cycles. The pump control system will also contain a manual override control. The developer will furnish all design data on the pumps and discharge force main including calculations and pump performance curves. The City will not be responsible for the maintenance of the lift station at any time.

- e. Retention basins will only be considered in cases where no other available positive outlet for the storm water runoff from the property. Retention basins with no outlet will be capable of storing two (2) consecutive one hundred (100) year storm events, which can be determined by:

$$V_t = 33,000 \times A \times C$$

- f. All open detention/retention systems must be fenced if the side slopes exceed one vertical to five horizontal. The earthen side slope will be no steeper than one vertical to three horizontal. Fences will be a minimum of six (6) feet high with locking access gates eight (8) feet wide.
- g. The bottom of the detention/retention systems must be sodded. All detention/retention systems must be permanently stabilized with maintainable densely rooted turf.
- h. A minimum of twelve (12) inches of freeboard must be maintained with a positive, non-erodible overflow capable of handling a one hundred (100) -year storm.
- i. Minimum grade on the bottom of the detention basin will be one (1) percent.
- j. For underground detention, use crushed, washed, angular stone, such as MDOT 6A.
- k. Maintenance
  - 1) Subdivisions and Residential Sites: The proprietor must provide for continued maintenance of storm water treatment system(s), through acceptance of ownership and maintenance responsibility by the property owner, Homeowner's Association, or Washtenaw County Water Resources Commissioner. The City will not accept ownership or maintenance responsibility of any storm water treatment system(s). The proprietor shall be responsible for the maintenance of the storm water

- treatment system(s) until all public utilities are dedicated and at least fifty one (51) percent of all homes have been constructed and sold.
- 2) Commercial, Industrial and Office Sites: The proprietor shall maintain the storm water treatment system(s) in proper working order at all times. The City will not accept ownership or maintenance responsibility of any storm water treatment system(s).
  - 3) For all sites, a maintenance schedule must be submitted as part of the site plan review process. In addition, prior to final acceptance of the project, the property owner must enter into a storm water maintenance agreement with the City.
- 
1. The proprietor must submit soil-boring logs to the City Engineer, taken within the detention/retention system area to a depth of twenty-five (25) feet below existing ground or twenty (20) feet below the proposed bottom elevation. Information regarding seasonal groundwater elevations must also be provided.
  - m. A minimum of twelve (12) inches of freeboard must be maintained with a positive, non-erodible overflow capable of handling a one hundred (100) year storm.
- 
5. In addition, the City of Dexter promotes the use of Best Management Practices (BMP's) wherever possible. Some examples of BMP's include, but are not limited to, infiltration facilities, sand filters, bio-retention, dry swales, filter strips, etc. The following resources are recommended for the design of BMP's:  
  
"Procedures and Design Criteria for Storm Water Management Systems", Washtenaw County Water Resources Commissioner. May 15, 2000.  
  
Guidebook of Best Management Practices for Michigan Watersheds, Michigan Department of Environmental Quality, 1993.  
  
Southeast Michigan Council of Governments (SEMCOG). Low Impact Development Manual for Michigan: A Design Guide for Implementers and Viewers. Michigan, SEMCOG: 2008.

## **V. Paving and Right-of-Way Improvements**

### **A. General:**

1. All paving will conform to the current standards and specifications of the City of Dexter, the Michigan Department of Transportation (MDOT) Standard Specifications for Construction, current edition, and the latest edition of the AASHTO guidelines outlined in A Policy on Geometric Design of Highways and Streets.
2. Any paving and/or right-of-way improvement should refer to the latest version of the Complete Streets Ordinance for design guidelines.

3. Any road improvements in the Washtenaw County right-of-way are subject to the review and approval of the Washtenaw County Road Commission (WCRC). A permit must be secured from the City of Dexter and the WCRC for construction.
4. Any road improvements in the Michigan Department of Transportation (MDOT) right-of-way are subject to the review and approval of MDOT. A permit must be secured from the City of Dexter and MDOT for construction.
5. Any improvements in City of Dexter right-of-way are subject to the review and approval of the City. A Right-of-Way Permit must be secured from the City for construction.
6. Construction of new or reconstructed driveways connecting to an existing state, county, or City roadway will be allowed only after an approved permit has been secured from the agency having jurisdiction over said roadway.
7. Cross-sections of all proposed pavement must be shown on the plans.
8. The minimum surface grade for asphalt paving will be one (1) percent. The minimum surface grade for concrete paving will be one half (1/2) percent. Pavement surface grades will not exceed six (6) percent.
9. Concrete curb and gutter will be required on all public roads unless otherwise approved by the City.
10. Underground storm sewers will be installed with all paving that requires concrete curbs and gutters.
11. Where pavements are to be constructed over clay soils or other poorly drained soils and a granular subbase is used, an approved sub drainage system (i.e. underdrains, etc) will be installed.
12. Design standards of Washtenaw County Road Commission within the document, "Procedures and Regulations for Developing Public Roads", will apply for horizontal and vertical alignment of all roadways.
13. Adequate soil borings must be taken and analyzed by a professional engineering firm qualified to do such work at the locations of all proposed public roads. Copies of the report must be submitted to the DPW, the City Engineer, and the Zoning Official..
14. Sufficient proposed grades must be shown on the plan to clearly show the drainage patterns.
15. Parking spaces, maneuvering lanes, and driveways will conform to the size and configuration of City ordinances. Access to county roads shall be reviewed and approved by the Washtenaw County Road Commission.

16. Passing lanes, acceleration lanes, deceleration lanes, tapers and by-pass lanes will be required according to the most current requirements established by the Washtenaw County Road Commission.
17. Roads and driveways must be constructed in such a way as to allow for adequate turning and stopping sight distance.
18. Road signs shall be installed in phases. The first phase includes installation of intersection control signs (i.e. Stop or Yield signs) and street name signs. The second phase includes installation of the remainder of the proposed signs.

The first phase signs shall be installed after the utilities and the leveling course of asphalt have been constructed. The second phase is installed at project build out, after the final wearing course is placed. This process lends to less sign replacement due to damage during construction, provides users with an understanding of future road characteristics, and provides signage for emergency vehicles throughout construction.

## **B. Typical Road Cross Section:**

The following minimum thickness requirements are based on adequate subgrade, subgrade drainage and average live loads. Each site must be examined individually and additional pavement thickness and/or base requirements may be necessary.

### **1. Residential Roads (private or public):**

At a minimum, the following cross-section should be used for residential roadways.

#### **a. Bituminous Aggregate Pavement**

Contractor to use performance graded binder PG58 -28.

##### **1) Subbase:**

A six (6) inch compacted thickness of MDOT Class II granular material shall be placed for all roadways except where existing soils consist of granular material approved by the City Engineer.

##### **2) Aggregate Base Course:**

A minimum eight (8) inch compacted thickness of 21AA crushed limestone shall be placed for all roadways. All materials shall be compacted to at least ninety-five (95) percent of maximum unit weight.

##### **3) Prime Coat:**

A prime coat of either MC-30 or MC-70 liquid curing asphalt shall be applied to the prepared subbase prior to application of any bituminous aggregate base course or leveling course.

4) Bituminous Base Course

A minimum two and one half (2½) inch thickness of MDOT 13A HMA Base Course shall be placed as a bituminous base course.

5) Bituminous Wearing Course

A minimum one and one half (1½) inch thickness of MDOT 36A HMA or MDOT 13A HMA Top Course shall be placed as a bituminous wearing course. A bond coat of either MS-2a or SS-1h anionic emulsified asphalt shall be placed between the all layers of bituminous mixtures.

b. Concrete Pavement:

1) Subbase

A six (6) inch compacted thickness of MDOT Class II granular material shall be placed for all roadways except where existing soils consist of granular material approved by City Engineer.

2) Aggregate Base Course:

A minimum six (6) inch compacted thickness of 21AA crushed limestone shall be placed for all roadways. All materials shall be compacted to at least ninety-five (95) percent of maximum unit weight.

3) Pavement

A minimum seven (7) inch thickness of MDOT Grade P1 concrete shall be placed for all concrete residential roadways.

2. Mixed-use roadways (private or public):

At a minimum, the following cross-section should be used for mixed-use roadways. For Federal-Aid eligible roads or roads on a truck route, the proposed cross-section should be evaluated on a project by project basis.

a. Bituminous Aggregate Pavement

Contractor to use performance graded binder PG58 -28.

1) Subbase

A six (6) inch compacted thickness of MDOT Class II granular material shall be placed for all roadways except where exiting soils consist of granular material approved by City Engineer. If patches of organic material are encountered during construction, it must be removed and

replaced with MDOT Class II sand.

2) Aggregate Base Course

A minimum ten (10) inch compacted thickness of MDOT 21AA crushed limestone aggregate shall be place for all roadways. All materials shall be compacted to at least ninety-five (95) percent of maximum unit weight.

3) Prime Coat

A prime coat of either MC-30 or MC-70 Liquid curing asphalt shall be applied to the prepared subbase prior to the application of any bituminous aggregate base course or leveling course.

4) Bituminous Base Course

A minimum three (3) inch thickness of MDOT 2C HMA Base Course shall be used as a bituminous base course.

5) Leveling Course and Wearing Course.

A minimum one and a half (1½) inch thickness of MDOT 3C HMA Leveling Course shall be used as a leveling course. A minimum one and one half (1 ½) inch thickness of MDOT 13A HMA Top Course wearing course shall be used. A bond coat of either MS-2a or SS-1h anionic emulsified asphalt shall be placed between the all layers of bituminous mixtures.

b. Concrete Pavement

1) Subbase

A six (6) inch compacted thickness of MDOT Class II granular material shall be placed for all roadways except where existing soils consist of granular materials approved by City Engineer. If patches of organic material are encountered during construction, it must be removed and replaced with MDOT Class II sand.

2) Aggregate Base Course

A minimum six (6) inch compacted thickness of 21AA crushed limestone shall be placed for all roadways. All materials shall be compacted to at least ninety-five (95) percent of maximum unit weight.

### 3) Pavement

A minimum nine (9) inch thickness of MDOT Grade P1 concrete shall be placed for all mixed-use roadway construction with concrete pavement.

#### 3. Non-Industrial Parking Lots:

The minimum design standards for parking lot pavements shall equal those requirements established in Section VI.B.1 for Residential Roadways. Parking lots shall conform to the applicable standards as established by the current guidelines of the American with Disabilities Act.

#### 4. Industrial Parking Lots:

Parking lots for industrial uses will be reviewed by the City Engineer on an individual basis with consideration given to intended use, type and volume of traffic and soil data furnished by the applicant. The minimum design standards for industrial parking lot pavements shall equal those requirements established in Section VI.B.2 for Mixed-Use Roadways. Parking lots shall conform to the applicable standards as established by the current guidelines of the American with Disabilities Act.

### **C. Curb and Gutter:**

Concrete curb and gutter will be required for all public and private roadways and parking lot construction in the City of Dexter. This requirement shall apply to all zoning districts in the City with the following exceptions:

In Research and Development (RD) districts, private roadway and parking lots may be constructed without concrete curb except for the first fifty (50) feet beyond the radii of any approach connecting a private drive to a public right-of-way. In the absence of concrete curb and gutter, site improvements must be designed, engineered and constructed in such a manner as to properly and completely collect and convey all on-site storm water runoff to approved points of discharge.

In areas where paved streets are currently uncurbed, it should be evaluated whether the the placement of curb and gutter is reasonable for the location.

Concrete curb and gutter for roadways constructed with bituminous pavements will be constructed to a configuration, dimension and material which comply with MDOT Standard Plan Curb and Gutter, either detail standard C4 or F4 or mountable D2, latest revision. The proposed curb and gutter shall match the adjacent curb and gutter into which it connects. Roadways constructed with concrete pavement shall be constructed with integral concrete curb and gutter.

Underground storm sewers will be installed with all paving, which requires concrete curb and gutter. The storm water runoff from all proposed site developments will be collected and treated on site or directed off site to approved points of discharge, as detailed in Section V of these standards. Where an approved point of discharge is not available to a site as determined by the City Engineer, such necessary improvements will be constructed or installed so as to properly and safely dissipate or retain storm water runoff on site.

For locations where no curb and gutter is proposed, a 2-foot wide gravel shoulder consisting of six (6) inches of MDOT 21AA or 22A will extend along both sides of the roadway.

#### **D. Typical Roadway Widths:**

For typical roadway widths, the requirements set forth in the latest edition of the AASHTO guidelines outlined in A Policy on Geometric Design of Highways and Streets should be followed. For minimum allowed roadway widths, refer to the City of Dexter's Road and Right-of-Way Improvement Policy.

#### **E. Driveways:**

1. Non-Residential Driveways: Driveways will conform to the standard driveway details, (see Appendix).
2. Residential Driveways, (Single Family)
  - a. Residential driveways will conform to the standard details, (see Appendix)
  - b. Concrete driveways must be six (6) inches thick from the back of curb to the property line. Concrete will conform to MDOT Grade P1.
  - c. Bituminous driveways will consist of a minimum compacted thickness of three (3) inches of bituminous pavement placed in two lifts over six (6) inches of compacted thickness of aggregate base course. The bituminous mixture will conform to MDOT HMA 36A.
  - d. Gravel Drives: Where the public road does not have a hard surface, the driveway may be constructed of 22A gravel without a hard surface. The gravel will be a minimum of six (6) inches compacted thickness within the road right-of-way and at least four (4) inches thick on private property.
  - e. The maximum width of a driveway opening, at the roadway edge, will not exceed forty (40) percent of the overall lot frontage width or twenty-four (24) feet, whichever is less.

- f. Where two driveway openings are proposed for a single residence, the following condition must be met before the plot plan is submitted to the City for approval:
    - 1) Minimum lot frontage: One hundred (100) feet
    - 2) Maximum opening: Forty (40) percent overall lot frontage; not to exceed a total combined width of forty-eight (48) feet; also not to exceed a maximum of twenty-four (24) feet for a single opening.
    - 3) Minimum between drives, (edge to edge): Forty-eight (48) feet.
  - g. New driveways cannot be closer than two (2) feet from the property line.
  - h. The driveway approach at the roadway edge cannot extend beyond the property line extended and create an encumbrance across the frontage of the adjacent properties.
  - i. The driveway approach at the roadway edge must be in front of the house or garage.
  - j. All ordinances applicable to the City of Dexter, Washtenaw County, and the Michigan Department of Transportation, dependent upon jurisdictional responsibilities, must be complied with.
3. Shared Driveways (Residential).
- a. A maximum of two (2) homes shall be serviced by one (1) driveway. If permitted, the Fire Department shall have the authority to approve the driveway to ensure that emergency services can be adequately provided to both homes. Appropriate access easements must also be secured for the driveway. Any road servicing more than two (2) residences shall be designated a private road, unless otherwise permitted by the City.
4. Driveway Inspection: Driveway approaches in the public right-of-way shall be inspected by a representative of the City. Inspection and approval of the driveway must be obtained prior to and after placing the driveway regardless of the driveway material. For fees associated with driveway inspection, see Section F: Fees under Development Requirements and Procedures.

## **F. Sidewalks:**

- 1. The following standards shall apply to sidewalk construction:
  - a. Sidewalks required for New Development:

Sidewalks shall be located in the right of way and one (1) foot from the ultimate Right of Way line.

- b. Sidewalks added to streets with Existing Structures:  
Recognizing that existing streets develop their own valued character over time, new sidewalks shall be located so as to preserve the character of the City; continue reasonable use and enjoyment of the yard; and avoid disturbing existing landscaping.
  - c. The walk will be five (5) feet wide constructed of four (4) inches of MDOT Grade P1 concrete on compacted 4 inches of Class II sand. The walk must be continued through driveway sections where it will be increased in thickness to eight (8) inches of MDOT Grade P1 concrete on 4 inches of Class II sand on major thoroughfares, collector roads, and alleyways and six (6) inches of MDOT Grade P1 concrete on 4 inches of Class II sand in all other instances.
  - d. Curbs must be tapered to meet the walk.
  - e. Cross slopes on the sidewalk will be a maximum of two (2) percent toward the street. Proposed grades must be shown along property lines driveways, and intermittent locations along the length of the walk.
  - f. Sidewalks must be free of utility structures and valves. Any structures, hydrants, poles, etc., which are existing along the alignment of the walk, must be relocated at the expense and coordination of the developer.
  - g. All sidewalk construction will be according to the latest ADA guidelines and the MDOT standards for ADA ramps with detectable warning domes.
  - h. New sidewalk ramps shall be constructed perpendicular to the centerline of the road across which the crosswalk is extending.
  - i. When a sidewalk ramp is replaced, the receiving sidewalk ramp must also be replaced.
  - j. Striping of crosswalks will be completed as determined by the Streets Administrator and/or the City Engineer.
2. Sidewalk Inspection: When sidewalks are placed in the public right-of-way, a representative of the City must be present to inspect the sidewalk installation. Inspection and approval must be obtained prior to and after placing the concrete. For fees associated with sidewalk inspection, see Section F: Fees under Development Requirements and Procedures.

### **G. Drainage in Right-of-Way:**

1. Enclosures of existing drainage ditches across the frontage of the site will generally not be allowed. The DPW may, however, require the enclosure if adequate controls on pavements and shoulders cannot be maintained and the health, safety and welfare of the public is endangered.
2. Side slopes on open ditch drainage will be three minimum horizontal to one vertical. The ditch bottom will be two (2) feet wide. Open ditch drainage will be permitted only in existing right-of-ways that currently utilize open ditch drainage and where roads do not have curb and gutter.

### **H. Streetlights:**

1. Ornamental streetlights are to be used within the boundary of the Downtown District Authority (DDA). Cutoffs shall be provided on each ornamental streetlight. Details for the ornamental streetlights and cutoffs approved by the City can be found in the Appendix.
2. Ornamental streetlights shall be LED.
3. When an applicant proposes improvements to a property within the DDA boundary, ornamental streetlights shall be placed within the right-of-way along the road frontage as part of the improvements. The developer shall provide a connection to the closest available light or handhole on the side of the street on which the development is proposed. The work shall also include the installation of conduit across the entire frontage of the property to facilitate adjacent expansions. Once installed, the City will accept responsibility of the streetlights as part of the dedication process.
4. Cable shall be 600V within 1-1/2" Schedule 40 PVC buried conduit. Conduit shall be provide a minimum of 2' cover and shall be placed behind the back of curb.

## **VI. Site Grading**

### **A. General:**

1. All proposed developments will be graded so that storm water runoff will be intercepted within the boundaries of the site. The runoff will then be treated on site or directed to an approved point of discharge. Open drainage ditches may be approved only where storm sewer systems are not feasible, as determined by the City Engineer.

2. No storm water runoff from developed property will flow onto adjacent land. Filling and grading will not create a barrier causing entrapment of water on neighboring land.
3. The developer will provide for overland flow of storm water from adjacent properties where the existing offsite land slopes to the site. The amount of runoff to be provided for from offsite lands will be equal to the amount of runoff from the offsite land in the undeveloped state.
4. Each single-family lot will be graded to drain away from the house to swales constructed along the lot lines. Swales will discharge to a catch basin, roadway gutter, or other approved drainage course.
5. Grading plans will consider the desirable natural features and the character of the land that must be preserved where possible.
6. No filling will be allowed in any areas of land within a proposed subdivision or other type of development which lie either wholly or in part within the floodplain of a river, stream, creek, or lake unless under the terms of a permit granted by the Michigan Department of Environmental Quality.
7. Trees, stumps (removed due to grading operations), excess topsoil, surplus materials, construction debris, etc., will be removed from the site and properly disposed of. All topsoil within the limits of construction is to be stripped and stockpiled. No topsoil is to be removed from the site without approval from the City Engineer.
8. Elevation representing the brick ledge, finished grade, and the first floor grade must be shown.
9. Proposed grading will meet abutting property line elevations. Differentials in grade must incorporate a minimum four horizontal to one vertical slope to the abutting property line.
10. Retaining walls are discouraged. Any wall separating a differential grade of more than eighteen (18) inches will be considered a retaining structure and will require a structural engineering design and review.
11. Asphalt surface parking lots and roadways will be graded to a minimum one (1) percent slope, except where concrete curb and gutters are to be provided. Where concrete curb and gutters are to be used, the transverse slope to the gutter will be a minimum of one (1) percent for parking lots and one-quarter (1/4) inch per foot for roadway crowns. Longitudinal gutter grades will be a minimum of one-half (1/2) percent for concrete curb and gutter. In general, pavement grades will not exceed six (6) percent.

12. All areas within twenty-five (25) feet of buildings will slope away from the building at a minimum slope of two (2) percent. All other areas will have a minimum slope of one (1) percent. The maximum allowed slope in lawn areas is 1 on 4.
13. All lawns or landscaped areas will drain to parking lots or swales. All swales must have a minimum slope of one (1) percent.
14. Catch basins will be placed at all low points in parking lots and swales.
15. Site grading will not be allowed until a Soil Erosion and Sedimentation Control permit has been obtained and all soil erosion and sedimentation control measures are in place.
16. A construction sequence shall be provided on the plans. Storm water management during construction shall be addressed.
17. Public utility construction can begin only after rough grading of the site is complete, as determined by the City Engineer.

## **VII. Soil Erosion and Sediment Control**

### **A. Sites Requiring Permits:**

Soil Erosion and Sedimentation Control (SESC) permits shall be obtained from the Washtenaw County Water Resources Commissioner. Permits are required for sites as noted in the Washtenaw County Soil Erosion and Sedimentation Control Ordinance. No construction will be allowed until the SESC permit has been obtained.

### **B. Intent of Permit:**

The purpose of this requirement is to ensure that no silt or sediment enters the public stream or watercourses. This is accomplished through sediment basins, filters, diversions, etc.

### **C. Plan Required:**

1. A Soil Erosion and Sediment Control Plan is required for all sites that require a permit. This plan can be made a part of the site construction plans or may be a separate plan. Step-by-step requirements for controlling siltation will be detailed on the plan. No work, including site clearing, will be allowed until approved soil erosion and sedimentation control measures are in effect.
2. Accelerated erosion and sedimentation must be prevented during all phases of construction including:

Initial site clearing.  
Utility construction.  
Building construction.  
Site paving.  
Final site approval.

#### **D. Inspection:**

1. Inspection will be made periodically throughout construction on the maintenance and effectiveness of soil erosion control methods.
  - a. If inspection reveals that the controls are not being implemented, a cease and desist order on all site construction may be issued.
  - b. Temporary Soil Erosion and sedimentation control measures shall not be removed until directed by the City Engineer.

#### **NOTE:**

THE EROSION CONTROL REQUIREMENTS MAY CONTROL THE PROGRESS AND SCHEDULING OF ALL CONSTRUCTION ON THE SITE.

### **VIII. Construction Specifications**

#### **A. General Requirements:**

1. Payment of Fees: Performance Guarantee Bond and the inspection fee deposit must be paid before construction starts. Performance Guarantee standards are within Article 21 of the Zoning Ordinance. All benefit charges, trunk line and transmission charges, and tap fees shall be paid when the building has been constructed and is ready for connection.
2. Insurance: Certificates in accordance with the "General Requirements" Chapter of this document will be submitted to and approved by the City before construction starts.
3. Preconstruction Conference: A preconstruction meeting will be held before the start of construction for all projects that involve site improvements of \$50,000 or more. The proprietor will arrange and schedule the meeting at least 3 weeks before the commencement of work. Those attending should include representatives of the:

Proprietor  
Proprietor's Engineer  
Development Coordinator  
Contractors and Subcontractors  
Fire Department Code Official  
City Engineer  
City Manager

Utilities Department  
Department of Public Works  
Community Development Manager  
Washtenaw County Water Resources Commissioner  
Washtenaw County Road Commission  
Representatives of Private Utilities Affected (electric, gas, phone, cable, etc.)

4. Inspection: An inspector must be present before any work is started on water mains, sanitary sewers, storm sewers, driveway approaches, sidewalk or detention/retention basins. The contractor or representative of the proprietor will notify both the City and the City Engineer at least seventy-two (72) hours before construction starts to arrange for inspection.

**Any work installed without inspection will not be accepted by the City and will not be allowed to connect to the system.**

5. Compaction Testing: All density testing will be provided by the proprietor through the design engineer or an independent testing company to verify the compaction requirements to the satisfaction of the City Engineer. This report shall be signed and sealed by a registered State of Michigan Engineer. A sieve analysis of the backfill material and copies of material test reports will be furnished to the City Engineer for approval.
6. Shop Drawings: Shop drawings will be furnished to the City Engineer two weeks before construction or installation of all special fabricated structural and mechanical parts of the system as determined by the City Engineer. Operation and maintenance manuals will be furnished for all water booster pump stations, sanitary lift stations, and similar installations.
7. Final Inspections and Acceptance: Prior to acceptance of public utilities and right-of-way for use and maintenance by the City, final inspections and all necessary tests of the system must be made. Any tests that fail will be redone after repairs have been completed. This will take place until the tests show satisfactory performance of the utilities. Any portions of the work found unacceptable will be repaired or replaced before acceptance.

Prior to final acceptance, a two (2) year maintenance and guarantee bond in the amount equal to one-half (1/2) the cost of the improvements (utilities, roadway pavement, sidewalks, curb and gutter, water main, sanitary sewers, storm drains, detention/retention systems, etc) will be posted with the City by the proprietor.

Final acceptance will not be made until all improvements and other heavy construction on the site have been completed. Record drawings, CAD drawings, and GIS layers (requirements noted in the Appendix) must be submitted and approved by the City prior to final acceptance.

For further requirements prior to acceptance and a description of the acceptance process, refer to the City's policy, "Dedication of Public Streets and Utilities."

## **B. Water Main Construction:**

1. Pipe Certification and Inspection: All pipe and fittings will be inspected when they are delivered to the job site. Certification papers showing that the pipe and fittings have been tested according to applicable specifications and that they meet project specifications will also be required. No cracked, broken or damaged pipe or fittings will be allowed.

Rejected pipe and fittings will be immediately removed from the job site by the contractor at no expense to owner.

Each piece of ductile iron pipe and related appurtenances will have its own weight and class designation conspicuously painted or cast on it. Class designations will be painted on all other pipe materials. Where required, other designation marks will be painted on the pipe or fittings to indicate correct location in the pipeline in conformity to a detailed laying schedule.

Water main stored onsite must have capped ends to prevent infiltration of dirt, debris, etc.

2. Preparation of Trench Bottom and Backfilling: At a minimum, the trench will be thirty (30) inches wide. Trench depths will be as shown on the plans and will generally provide not less than five and one half (5 1/2) feet of cover from the top of the water main to the final surface grade above such mains. The bottom of the trench will be excavated neatly to required grade and filled with four (4) inches MDOT Class II sand thoroughly compacted by tamping before the pipe is laid. The bedding will be dug out at each bell end of the pipe to conform to the shape of the bell. Blocking under the pipe is strictly prohibited. After the pipe has been laid, sand bedding will be continued to a level twelve (12) inches above the top of the pipe barrel and mechanically tamped to 95% of max unit weight.

Backfill around the pipe will be under, around, and above the top of the pipe. Backfill will be placed in horizontal layers not more than six (6) inches deep and each layer will be thoroughly compacted using mechanical tampers or other approved means before the following layer is placed. If suitable earth is not available from the trench excavation, Class II sand will be furnished from offsite and placed and tamped as specified. The remaining backfill will be completed with the approved excavated material free of cobbles, frozen material or other deleterious or foreign material. Backfill will be thoroughly compacted to prevent settlement, and prior to acceptance of the work, the contractor will refill any trenches that have settled.

Trenches under the influence of road surfaces, pavement, sidewalk, curb, driveway will be backfilled with Class II sand. The material will be placed in six (6) inch layers. Each layer will be compacted by using suitable compaction equipment to at least ninety

five (95) percent of maximum unit weight before the succeeding layer is started. Maximum unit weight will be determined by the current Method of Test for the Compaction and Density of Soil, AASHTO Designation: T-99, or by the Cone Density Method developed by the Michigan Department of Transportation (MDOT), as required.

Except at pipe joints and service connections, backfill to an elevation at least six (6) inches above the top of the pipe will be placed before the hydrostatic test. In no case will the test requirements be relaxed because the trench may have been backfilled.

3. Handling Pipe, Fittings, Specials, etc.: All pipes and castings will be unloaded and distributed along the line of work in such a manner and with such care as will effectually avoid damage to any pipe or special. Dropping the pipe or fittings directly from the truck will not be allowed. Care must also be taken to prevent abrasion of pipe coating. Wherever the coating has rubbed off, the part will be recoated as required by the nature of the pipe coating.
4. Installation of Pipe: The water main will be installed according to the published installation guide of the pipe manufacturer, except as otherwise specified in this document. Whenever the instructions given by the manufacturer vary with the provisions specified in this document, the laying standards provided in this manual will govern.

Proper tools for installing the pipe, including pipe pullers, special cutters, spacing yokes, machining tools, test caps, ring feeler gages, etc., will be provided at the site of the work.

5. Defective Pipe and Fittings: No pipe or fitting that is known to be defective will be laid in the work. Any piece found defective after it has been laid will be removed by the contractor and replaced by a sound and perfect piece. If the major part of a defective pipe is sound, the good end may be cut off and used. Every such cut will be square and ground smooth. The cut surfaces of ductile iron pipe will be painted with two (2) coats of approved asphaltum metal protective paint, where required by the City Engineer.
6. Laying Pipe: The pipe will be carefully laid to line and grade and will have bearing over its entire length except at joints where the joint hole will be of such size as to give adequate room for working. The pipe will be laid with a minimum cover as shown on the drawings.

Immediately before laying, each section of pipe or fitting will be thoroughly cleaned inside of all debris; dirt or other accumulated foreign material. It will be inspected for damage to the coating or pipe material and repairs will be made where required or removed from the job site if deemed irreparable by the engineer. Care will be taken to keep the interior of already laid pipe clean and free from dirt and other foreign material. Bulkheads or other means will be used at the open end of the previously laid pipe for this purpose.

After a length of pipe is placed in the trench, the spigot will be centered in the bell of the adjacent pipe, the pipe shoved into proper position in the collar or bell and brought into true alignment, and there secured with sand bedding, carefully tamped under and on each side of the pipe.

7. Joint Restraint: All pipe deflections over eleven and one-quarter (11 1/4) degrees and all tees will be restrained, tied or harnessed in a manner acceptable to the engineer. The restraint will be applied to joints each way from deflection or tee an adequate distance to resist the axial thrust of the test pressure (See Restrained Joint Schedule below). Details of all proposed joint restraint, showing type and locations, will be submitted to the engineer for approval.

#### Restrained Joint Schedule

Pipe Diameter (in.)	Degree Bend			
	90	45	22 1/2	11 1/4
4"	21	9	4	2
6"	30	12	6	3
8"	39	16	8	4
12"	53	22	11	5
16"	74	31	15	7
20"	90	37	18	9
24"	107	44	21	10

Notes:

1. Lengths are shown in linear feet from the center of the fitting.
2. For plugs provide same as 90-degree bend.
3. For tees, provide same as 90-degree bend on the branch, plus min. 20 lft on each leg of the run, or as required by City Engineer
4. For reducers, use 45-degree bend.

Acceptable methods of joint restraint for ductile iron pipe will be provided according to one of the following methods:

- a. Restrained joint gaskets such as Field-Lok gaskets or other approved equal.
- b. Mechanical joint retainer gland such as Mega-Lug, Romag, or other approved equal.
- c. Stainless steel tie-rod system as approved by City Engineer.

- d. Concrete thrust blocks through sixteen (16)-inch diameter pipe, only upon approval of City Engineer, and Super Lock or Lokfast above sixteen (16) inch diameter pipes.
  - e. Concrete encasement method of joint restraint for pipe twenty (20) inches in diameter and larger will be subject to the City Engineer's approval.
- 8. Service Connections and Taps: Water mains will be tapped for corporation cocks where shown on the drawings or required for testing and sterilization of the completed water mains. For ductile iron pipe, the cocks will be threaded directly into the pipe.
  - 9. Corporation Stop: Corporation stops will be one (1) inch Ford compression fittings or approved equal. Corporations larger than 1 inch will be as called for on the drawings.
  - 10. Fittings, Valves, Hydrants and Adapters: Valves, fittings and hydrants will be installed using the current standards for joints being used for the project. Wherever adapters are required to properly connect proposed water main with existing pipe of other material or manufacture, the nominal inside diameter of the adapters will be of the same size as the nominal diameter of the pipe connected thereto. Adapters will also be furnished and used as required by the manufacturer for connection to fittings. Special machined faced parts will be provided where required to connect to existing mains.
  - 11. Setting Hydrants: At points indicated on the drawings, a hydrant assembly will be installed consisting of a hydrant, six (6)-inch gate valve, a three-piece adjustable cast iron valve box, and all pipe necessary for a complete job. Valves will be located two (2) feet from the hydrant, as shown on typical setting detail on the standard drawings.

Each hydrant will be set plumb and braced firmly in this position. Connection of the hydrant to the branch will be made by means of mechanical joints, as herein specified under jointing. All joints between the hydrant and the main will be restrained by the same means as used for water main as specified under Section B, Item 7 of this chapter.

If hydrants are furnished with drain outlets, the outlets will be permanently capped or plugged. After the hydrant has been set, an additional one (1) foot of gravel will be spread and tamped around the hydrant. When this has been done, the remaining backfill will be placed and compacted, taking care at all times to avoid jarring the hydrant.

After hydrants have been set and tested, the part above ground will be painted with two (2) coats of first quality metal protective paint. The City of Dexter Water Utilities Department will designate the color.

- 12. Hydrant Testing: Each hydrant assembly will be tested by the contractor. Final orientation of the hydrant must be completed prior to testing. The hydrant must be oriented toward the street. The test will consist of flushing the hydrant for a minimum of ten (10) minutes. During the testing period the six (6) inch gate valve will be closed and opened. The contractor will furnish the necessary hoses for disposal of owner-furnished water. A testing schedule and method of disposing of flushing water

will be submitted to the engineer for approval. The contractor will coordinate the testing schedule with the local fire department and the City of Dexter.

13. **Connections to Existing Mains:** Where shown on the plans, connection of existing mains to new mains will be done only after the new mains are shown to be sterile by results of the bacteriological analysis.
14. **Flushing of Water Mains:** Prior to disinfection and hydrostatic testing, the newly constructed water mains will be thoroughly flushed to remove all accumulated debris that may have entered the line during the construction. A poly pig, or approved equal equipment, will be used to flush accumulated debris. How often the poly pig is run through the water mains will be determined by the debris discharging from the effluent. Several passes with the poly pig through the newly constructed system may be required before the main is acceptable. Procedures for using the poly pig, or approved equal equipment, will be per the manufacturer's specifications.
15. **Sterilization of Mains:** Testing standards shall meet AWWA C-651, latest revision. After pressure testing and before hydrostatic testing, all new pipelines will be flushed until the water runs clear. After flushing, liquid chlorine will be added to the water in the amount of eighty (80) parts per million (ppm). This will require the addition of the following quantities of liquid chlorine:

<b>Size of Pipe</b>	<b>Pounds of Liquid Chlorine (100 percent) Per 100 Feet Length of Pipe</b>
4 inches	0.043
6 inches	0.098
8 inches	0.174
10 inches	0.272
12 inches	0.392
14 inches	0.532
16 inches	0.695
18 inches	0.88
20 inches	1.096
24 inches	1.563
30 inches	2.445

After the main, or section of it, has been filled with chlorinated water, a minimum contact period of twelve (12) hours will be required with an average chlorine level of fifty (50) ppm, after which the main will be flushed with water from the distribution system until the chlorine residual of the water in the main is one half (1/2) part per million. The main will then be allowed to stand for twenty four (24) hours. At the end of this period, two samples each will be drawn from the main at two different locations on two successive days for bacteriological analysis at the Dexter City water treatment plant laboratory.

If these analyses show the presence of harmful bacteria, the contractor will repeat the sterilization process until the mains are shown to be sterile by the results of the bacteriological analyses.

The contractor will furnish the chlorine and all necessary equipment for its application. The owner will supply the water. The contractor will arrange with the owner for bacteriological analyses. The contractor will dispose of high residual chlorine water by a method approved by the City Engineer.

16. Hydrostatic Testing of Water Mains shall conform to AWWA C600 standard, latest revision. Prior to and during the hydrostatic test, the new main is not to be connected to the existing water system, except as specified herein. Temporary blow-offs, caps or plugs will be provided at the ends of the new main.

At the option of the authorized representative of the community having jurisdiction over the work, the contractor may test against closed valves providing the new main to be tested and the testing apparatus will have first been flushed and chlorinated according to accepted procedure. After chlorination and subsequent flushing, a sample of the water must show, by test the Dexter City water treatment plant laboratory, safe bacteriological results. If the hydrostatic test is unsatisfactory, the contractor will cut the new main, install caps or plugs, pressure test, and rechlorinate without additional cost or charge.

The contractor will furnish all necessary personnel, temporary timber bracing, plugs, test pumps and all other necessary apparatus for conducting the test. The pressure gauge must read to the nearest 1 psi.

Before applying test pressure all air will be expelled from the pipe. If necessary to accomplish this, taps will be made at points of highest elevation in ductile iron or asbestos-cement pipe, and such openings subsequently closed, prior to the test, with tight threaded brass plugs.

Test pressure will be maintained at one hundred fifty (150) pounds per square inch (psi) by pumping potable water into the pipe for at least one (1) hour for pipe sizes twelve (12) inches and under, two (2) hours for pipe sizes over twelve (12) inches, and in all cases long enough to permit assurance of a satisfactory test. Leakage, as measured by the quantity of water pumped into the pipe to maintain one hundred fifty

(150) psi pressure during the test, will not exceed the rate of fifty (50) gallons per inch diameter of main, per mile of pipe, in twenty four (24) hours.

Unless otherwise directed, each joint in the section of main being tested will be carefully examined while the main is subjected to full test pressure, and any joint showing visible leakage will be repaired as necessary to produce a tight joint. Any faulty pipe, fittings, gate valves, or other accessories disclosed by testing will be replaced with sound material. The test will be repeated as necessary until the specified requirements have been met.

If the authorized representative of the community having jurisdiction over the work directs the contractor to backfill the trench before the main is tested, and difficulty is experienced in obtaining a satisfactory hydrostatic test, the joints will progressively be exposed and repaired in such manner as to provide protection to the pipe. Under no circumstances will the test requirements be waived or reduced because the trench is backfilled.

17. Painting: All iron pipe, valves, bolts, and any other portions of the water main exposed inside manholes or other structures will receive two coats of Inertol No. 49, Tape Coat TC Mastic, or approved equal material. If necessary, heat will be provided to maintain good drying conditions. All items to be painted will be dry and clean before they are painted. Any rust or scale will be removed by wire brushing or scraping before painting, if required.
18. Pipe Placed in Casings: Pipes will be placed in casing pipe in the locations shown on the drawings. These pipes shall be installed following the latest revision of AWWA C600.

For road crossings, all void spaces between the casing pipe and the carrier pipe will be filled with cement grout meeting the requirements of MDOT Standard Specifications for Natural Sand 2NS. Sand will be placed by flushing or other methods approved by the engineer. The contractor will furnish the engineer with information on the quantity of sand placed.

For railroad crossings, all void spaces will be cement grouted.

The annular space at the ends of the casing pipe will be bulkheaded with a minimum of eight (8) inches thick solid masonry with one half (1/2) inch fiberboard cushion between the masonry and carrier pipe.

All necessary skidding materials required to protect the carrier pipe will be furnished.

19. River Crossings: River crossings will be made with a freely deflecting locked joint pipe. Pipe will be either ductile iron with bell ball type joints or reinforced concrete pressure pipe with bell bolt type of joints.

The pipe will be of the same class and grade as called for on the plans.

Ball Joint River crossing pipe may be installed by pulling or floating across the river.  
Bell bolt joint pipe must be laid on grade by coffer-damming the trench.  
The trench will be backfilled with clean washed stone.

### **C. Open Cut Sewers:**

1. General: Sewers will be considered as pipes or conduits between the extreme ends of the project including branch lines.

All labor, tools, equipment and all materials necessary to excavate for, lay, join, backfill, and finish the sewer will be considered as part of the sewer construction.

Unless otherwise allowed under detailed specifications for a particular type of sewer or unless permitted by the engineer, construction will begin at the outlet end of the sewer and proceed upgrade.

2. Sewer Pipe: Sewer pipe will be of approved type and class designated for the specific locations or intended uses shown or noted on the contract drawings. Any deviation from type or class of pipe shown on the drawings will not be allowed, except upon receipt of written approval of the engineer.

Pipe joints will be of the approved type and/or brand called for on the contract drawings.

3. Cement Mortar Pointing: All pipe joints on sewers thirty six (36) inches in diameter and larger will be pointed on the inside with approved non-shrink cement mortar composed of one part cement and two parts sand. On bituminous mastic joints the compound will be removed to a depth of three-quarters (3/4) of an inch from the inside the joint and painted as described above.

4. Excavation: Excavation will include clearing the site of work and removal and disposal of all materials necessary to be removed in the construction of all the work..

Excavation will be of sufficient width and depth to provide adequate room for construction and installation of the work to the lines, grades, and dimensions called for on the plans. However, the width of a trench from the invert to a height twelve (12) inches above the top of the sewer barrel will not be greater than twelve (12) inches plus the outside diameter of the sewer barrel, except four (4)-inch through twelve (12) inch sewers the width of the trench may be thirty (30) inches.

If maximum trench width, as specified above, is exceeded, unless otherwise shown on the drawings, the contractor will install, at his or her own expense, concrete cradling or other bedding as approved by the City Engineer, to support the added load of the backfill.

Where, through the contractor's construction procedure, or because of poor existing ground conditions it is impossible to maintain alignment and grade properly, or as directed by the City Engineer, the contractor will, at his or her own expense, excavate below grade and replace with 6A aggregate or slag to ensure that the pipe, when laid, will maintain the correct alignment and grade.

Excavated materials will be temporarily stored along the trench in a manner that will not cause damage to trees, shrubs, fences or other property nor that will endanger the bank of the trench by imposing too great a load thereon.

Excavation for structures will be extended sufficiently beyond the limits of the structure to provide ample room for form construction and other construction methods to be followed, whenever necessary.

When excavating for sewer lines, the excavation will always be finished to the required grade for an adequate distance ahead of the completed sewer but unless otherwise permitted by the engineer, not more than one hundred (100) feet of trench will be open at once before the completed sewer line.

Open cut excavations for shafts or other structures will be adequately braced and/or sheeted to prevent caving or squeezing of the soil. Tunnels will be sheeted and/or braced as necessary to enable the work to proceed with safety to the workers, the work, and neighboring structures.

All excavations will be completely dewatered before constructing the sewer or other structures. Adequate provisions will be made to prevent water from flowing through or over newly placed concrete or brickwork. Drainage will be carried to sumps from which the water may be pumped

5. Test of Pipe: The contractor will have tests of pipe and strength made by an independent testing laboratory. Tests of up to four (4) lengths of sewer pipe per hundred (100) lengths may be required to show compliance with the specifications. All pipe delivered to the job site will be accompanied with the manufacturer's certificate of compliance to the specifications.

The contractor will submit shop drawings or data sheets for all manhole castings, pipe to manhole connections, valves and backfill materials.

6. Laying Pipe: All pipes will be laid to the line and grade called for on the plans. Lasers shall be used to accurately position pipes. The finished work will be straight and will be sighted through between manholes.

Each pipe will be inspected for defects before being lowered into the trench. Inside the pipe and outside the spigot will be cleaned of dirt or foreign matter.

Construction will begin at the outlet end and proceed upgrade with spigot ends pointing in the direction of the flow. Pipes will be laid on a four (4)-inch through six (6) -inch sand cushions that will be carefully prepared so that the entire bottom half of pipe will

bear against the cushion. If, through carelessness or other reasons, the subgrade has been disturbed so that refilling is necessary to bring pipe to grade, such refilling will be done with sand or gravel thoroughly tamped in place. Bell holes will be excavated so that the full length of the barrel will bear uniformly on the subgrade.

The pipes will be centered in bells or grooves and pushed tight together to form a smooth and continuous invert. After laying the pipe, care will be taken not to disturb its line and grade. Any pipe found off grade or out of line will be re-laid properly by the contractor.

Where pipe is laid in wet trenches or trenches with running sand, the contractor will provide and use mechanical means for pulling the pipe home in making up the joint and holding the pipe joints tight until the line is complete. Mechanical means will consist of a cable placed inside the pipe with a suitable winch, jack, or come-along for pulling the pipe home and holding it in position.

Mechanical means will be used for pulling home all rubber gasketed pipe regardless of trench conditions where manual means will not result in pushing and holding the pipe home.

If maximum trench width specified under Section C, Item 4 of this chapter is exceeded, unless otherwise shown on the drawings, the contractor will install, at no expense to the City, concrete cradling or other bedding as approved by the City Engineer to support the added load of the backfill.

7. Backfilling: Backfilling of sewer trenches will follow closely behind the laying and joining of sewer pipe but only after completed section has been inspected and approved by the engineer for backfilling. Concrete sewers constructed monolithically in the trench will be backfilled only after the concrete has attained sufficient strength to sustain the entire load imposed by backfilling operations.

Sewer pipe will be laid on a minimum of a four (4)-inch thick sand cushion and backfilled with porous sand tamped in six (6)-inch layers to a height of one (1) foot above the top of the pipe. Care will be taken to fill all voids under and around the pipe. The remainder of the trench will be backfilled with approved excavated trench material (excluding blue or gray clay) or sand, free from large stones and lumps, and will be placed in twelve (12)-inch layers that will be thoroughly compacted in a manner that will prevent subsequent settlement. Backfill material will be deposited in the trench with care to not disturb the sewer and to equalize pressure on the sewer.

Where called for on the plans, special concrete cradle or other special bedding materials will be used to the depths specified and the remainder of the trench will be backfilled as described above.

Trenches under road surfaces, pavement, curb, driveways and sidewalk and where the trench is within the influence of the pavement will be backfilled with bank run sand meeting the requirements of "Granular Material, Class II," MDOT Specification

902.05. Material will be placed by the "Controlled Density Method, MDOT Specification 205.03.H.4 (a) or by other approved means.

Trenches to be constructed under future pavement, when called for on the plans, will also be backfilled with granular material, Class II, by the controlled density method or other approved means.

Attention is directed to the fact that backfilling and restoration of improvements in streets, roads or highways will be subject to regulation and inspection by the public authority having jurisdiction in each case, and that all such work must meet the authority's satisfaction.

If any inconsistencies exist between the appropriate public authority's backfill requirements and the requirements herein provided, the more rigid requirements will govern.

Trenches constructed in established lawn areas would be compacted to allow restoration with sod shortly after completing the backfill without appreciable settlement.

No backfill will be placed around manhole walls until forty eight (48) hours after the plaster coat has been applied to the outside walls, nor will backfill be placed around and over the top of concrete structures until the concrete has attained sufficient strength to sustain all the loads imposed by the backfilling operations.

#### 8. Underground Installation of Flexible Thermoplastic Sewer Pipe:

##### a. General

The intent of this section is to require the installation of plastic pipe in accordance with ASTM D -2321 and the Recommended Standard for Wastewater Facilities, latest edition.

The pipe will be bedded true to line and grade with uniform and continuous support from a firm base. Blocking shall not be used to bring the pipe to grade. Properly placed and compacted backfill shall be required to provide lateral support.

The nature and particle size distribution of the material used in bedding, haunching and initial backfilling, as well as the manner and care with which it is installed are important factors in achieving satisfactory installation of flexible conduit. The amount of diametric deflection as well as the care with which the embedment material is placed under, around and over the pipe. Installation shall be in accordance with the plans, specifications, manufacturer's recommendations and ASTM-D 2321.

b. Embedment Materials

Embedment materials listed herein include a number of processed material plus the soil classifications listed under the Unified Soil Classification System (USCS) (Test Method D-2487 and Recommended Practice D-2488).

Class I – Angular one-quarter (1/4) inch to one and one half (1-1/2) inch graded Stone, included a number of fill materials that have regional significance such as coral, cinders. Crushed stone, crushed shells.

Class II- Coarse sands and gravels with a maximum particle size of one and one half (1-1/2) inches, including various graded sands and gravels containing small percentages of fines, generally granular and non-cohesive, either wet or dry. Soil types GW, GP, SW and SP are included in this class.

c. Trench Construction

During preparation of the trench certain conditions may be encountered requiring special treatment in order to provide adequate bedding and foundation for the installation of flexible pipe. During construction of the trench it may be necessary to stabilize the trench walls or bottom. Some of the anticipated conditions are as follows:

1) Stable Trench Walls

The width of the trench at any point below the top of the pipe should not be greater than that necessary to provide adequate room for joining the pipe. And compacting the haunching and initial backfill. The trench width at the top of the pipe directly affects the soil load imposed on the pipe. Compaction of the foundation, bedding, haunching and backfill should extend to the trench walls in narrow trenches.

2) Unstable Trench Walls

Where an unstable or running soil condition is encountered in the trench, the contractor shall stabilize this condition before laying pipe. This condition is most often encountered when excavating below the groundwater table. Depending on the severity of the condition, the contractor may elect to use tight sheeting, stay bracing or a trench box to control trench conditions during pipe laying operations.

Well points or underdrains may also be used to control excessive groundwater conditions. Care must be taken to prevent displacement of running soil or the removal of sand or silt during dewatering. To obtain the desired lateral support for pipe laid under unstable trench wall conditions where sheeting or other similar means are not left in place the trench width should be a minimum of five (5) pipe diameters.

### 3) Unstable Trench Bottoms

Unstable trench bottoms must be stabilized or alternative foundation methods found prior to laying the pipe. Special foundations include wood pile or sheeting capped by a concrete mat with bedding on top, wood sheeting with keyed- in planed foundation, or the stabilization of the bottom material.

In the case of stabilizing the bottom material the contractor is required to remove a sufficient depth of unstable soil and replace it with a foundation and bedding of processed stone or processed gravel. The stone or gravel shall be suitably graded and act as an impervious mat into which the unstable soil will not penetrate.

The depth of the processed material used for foundation and bedding shall depend upon the severity of the trench bottom soil condition. Installation of such foundations and bedding material shall be accomplished in six (6) inch layers and suitably paddled or compacted. If the foundation material contains larger particles, which could create a hazard to the pipe, a cushion of acceptable bedding material shall be placed between the foundation and the pipe.

### 4) Over Excavation

During the course of the construction, should the trench be inadvertently over-excavated to a point between six (6) inches and twelve (12) inches below the bottom of the pipe but not beyond twelve (12) inches, the contractor shall fill the area of over-excavation with an acceptable class of embedment material and compact to ninety-five (95) percent of a Standard Proctor Density. Any area of over-excavation below twelve (12) inches from the bottom of the pipe shall be filled with processed stone or gravel in the same manner as described in Item 3. Over-excavation and subsequent filling of the over-excavated area shall be accomplished by the contractor at no additional cost to the City.

### 5) Running Water

Under certain conditions, the contractor may be faced with unusual amounts of water running in the trench, which may require removal in order to properly lay the pipe. The contractor may simply elect to remove the water with trench sided pumps and use Class I material for bedding. The depth of the Class I bedding will depend on the amount of water. Care shall be taken to ensure that the trench wall soil material will not be removed from the area adjacent to the bedding as the result of running water.

If the contractor uses either well points or underdrains to control the excessive groundwater and Class I material is used as bedding and underdrain, the depth of material must be to a point at least twelve (12) inches above the top of the pipe.

The discharge of excessive water from the trench shall be in accordance with all State and Federal requirements.

#### 6) Rock Excavation

When the pipe is to be installed in a rock cut, a four (4) inch to six (6) inch depth of bedding will be required. The bedding shall be either Class I or Class II material as shown in the plans and details. If running water is encountered in the rock cut the procedures noted in Items 5 shall be employed.

### **D. Wide Trench:**

Care shall be taken by the contractor to provide as narrow a trench as possible at a point level with the top of the pipe. If the trench width is greater than six (6) pipe diameters, the haunching and initial backfill shall be compacted to a point at least two and one-half (2-1/2) pipe diameters from either side of the pipe. Depending on the severity of the trench conditions, the bedding and foundation shall be compacted to at least the same point or wider and if necessary, to the trench wall. Where an unstable trench bottom is encountered, the entire trench bottom shall be stabilized.

If a soils exploration program has been conducted, that information will be made available to the contractor. In suspect areas the contractor should make an independent investigation and determination of the underground soil conditions as they relate to trench conditions.

### **E. Bedding:**

Prior to the installation of the pipe, the contractor shall bring the bedding material to grade along the length of the pipe to be installed. To ensure that adequate and uniform support is provided under the pipe and to avoid differential settlement of the pipe certain procedures shall be adhered to and precautions taken as outlined below:

**Class I Material-** When Class I material is used for bedding, little or no compaction is necessary due to the angular nature of the particles. A depth of four (4) inches to six (6) inches of Class I material is generally sufficient to provide uniform bedding depending on the trench conditions encountered. If Class I material is used for bedding it must also be used for haunching at least up to a point twelve (12) inches above the top of the pipe to avoid loss of side support through the migration of trench backfill material into the bedding.

## **F. Haunching and Initial Backfill:**

This section outlines the minimal installation procedures related to haunching and initial backfill.

### **Class I Material**

Wet Conditions- In any area where the pipe will be installed below the existing or future groundwater table or where the trench could be subject to groundwater inundation, Class I material, when used shall be placed to a point twelve (12) inches above the top of the pipe. It is important that the contractor work the Class I material to ensure that it has been placed under the haunch of the pipe to provide adequate side support. Precautions shall be taken to prevent movement of the pipe during the placing of material under the pipe haunch.

The backfill material shall be free of large particles. Where unstable trench conditions such as silts or fine sands exist, care shall be taken to prevent the loss of side support. The loss of side support will increase pipe deflection.

### **Class II Material**

Class II material shall be placed to the spring line of the pipe and compacted.

The contractor shall direct operations to ensure that sufficient material has been worked under the haunch of the pipe to provide adequate side support and to prevent movement of the pipe during placement.

Initial backfill shall be placed in at least two (2) stages; one to the top of the pipe and the other to at least twelve (12) inches above the top of the pipe. Each stage of haunching and backfilling shall be compacted.

Class II material shall be placed in maximum lifts of six (6) inches and compacted to a minimum of eighty-five (85) percent of Standard Proctor Density.

## **G. Pipe Stiffness:**

Pipe stiffness requirements shall be in accordance with ASTM D – 2412, acceptable industry standards and the recommendations of the pipe manufacturer.

## **H. Special Considerations:**

### **1. Bell Holes for Elastomeric Seal Joints**

When the pipe being installed is provided with elastomeric seal joints, bell holes shall be excavated in the bedding material to allow for unobstructed join assembly. Care shall be taken so that the bell hole is no larger than necessary

to accomplish proper joint assembly. Where the joint has been made, the bell hole should be carefully filled with bedding and haunching material to provide for adequate pipe support throughout its entire length.

2. Minimum Cover for Load Application

A minimum of thirty six (36) inches of cover over the top of the pipe shall be provided prior to wheel loading of the trench. A minimum of forty eight (48) inches of cover shall be provided before either a hydrohammer or hoe-pack is used to compact the trench.

3. Use of Compaction Equipment

Care shall be taken to avoid contact between the pipe and compaction equipment. Compaction of haunching, initial backfill and backfill material shall generally be done in such a way to avoid use of the compaction equipment directly above the pipe until sufficient backfill has been placed.

4. Removal of Trench Protection

If Sheet piling or other trench protection is removed, care shall be taken so as to not disturb previously constructed foundation bedding, haunch material and initial backfill. If it has been necessary to drive sheet piling or other trench protection below the top of the pipe, consideration should be given to leaving it in place. Removal could jeopardize the side support necessary for flexible conduits.

5. Maintenance and Restoration of Pavement, Walks, Road Surfaces, etc.: All concrete or asphalt pavements, curbs, drives and walks removed, destroyed, or damaged by the contractor will be replaced by the contractor in a manner equal or superior to the previously existing pavement. In removing the concrete pavement, a saw will be used and a three-quarter (3/4) inch-deep cut made on each side of the part to be removed.

Where trenches cut or damage roadways or drives, other than hard surface pavements, the contractor will thoroughly compact the trench backfill and restore the roadway with a road gravel fill at least eight (8) inches thick and will, during the life of the contract, maintain the roadway in good condition with additional gravel as settling takes place.

6. Sewer and Drainage Structures: Manholes, catch basins, inlets and special structures will be constructed at the locations shown on the plans and will be of the size and type called for on the plans. Manholes and catch basins will be constructed to conform to City specifications and in accordance with the detailed drawings.

7. **Sanitary Manholes:** Sanitary manholes will be constructed of precast reinforced concrete risers and tops in conformance with the detailed drawings and specifications. The manhole bottom riser section will have the base slab poured monolithically with the riser.

Joints on precast risers and tops will be modified grooved tongue with rubber gaskets conforming to the requirements for concrete sewer pipe.

Joints around pipes entering or leaving manholes will be flexible rubber joints such as Press Wedge II, Res-Seal, Kor-N-Seal, LinkSeal, or other approved equal. All pipe openings will be fabricated at the time of manufacture, and no manholes will be accepted where openings have been made in precast units at the work site.

All sanitary manholes shall have an infiltration fabric placed from the top of the frame casting base over the adjustment rings and over at least half of the transition cone section of the manhole chimney. The material shall be Infa-Shield or approved equal.

8. **Drop Manhole Connections:** Drop manhole connections will be constructed on sanitary manholes in conformance with the standard detail drawings whenever a sewer enters a manhole at an elevation of eighteen (18) inches or more above the invert of the outlet sewer pipe.
9. **Sanitary Test Manhole:** The first manhole upstream from point of connection to existing sanitary sewer system will have a twelve (12) inch-deep sump that will be filled with concrete and channeled upon successful completion of infiltration testing.

The outlet pipe from this manhole will be plugged with a waterproof stopper to prevent discharge to the existing system until acceptance of the system by the municipality. The requirement to provide a sump may be waived by the engineer where testing is to be done by either low pressure air testing or exfiltration testing.

10. **Storm Drainage Structures:** Storm sewer manholes, catch basins and inlets will be constructed of precast reinforced concrete, concrete manhole block, brick, poured-in-place reinforced concrete, or combinations of the above. Storm sewer structures will conform to the detailed drawings and specifications.

Joints on precast reinforced concrete risers and tops may be either cold applied bituminous mastic or modified grooved tongue with rubber gasket.

The entire outside surface of all concrete block and brick masonry portion of drainage structures will be plaster coated with one half (1/2) inch-thick mortar. Inside the sump must also be coated.

All manholes on storm sewers eighteen (18) inches in diameter and smaller will have two (2) feet-deep sumps unless otherwise called for on the plans.

Poured in place reinforced concrete structures will conform to detail drawings and the requirements for structural concrete construction provided in MDOT Section 706 of Standard Specifications for Construction.

11. Construction Methods for Sewer and Drainage Structures: Construction methods for the sewer and drainage structures will conform to MDOT Specifications Division 4, except as stated in this document.

Construction methods for poured in place structural concrete and the placement of steel reinforcement will conform to Section 706 of MDOT Standard Specifications for Construction.

Precast reinforced concrete units will be such that no more than fifty (50) percent of the circumference, measured on the inside face will be deleted on any horizontal plane for sewer pipe openings. There will be no less than twelve (12) inches of residual concrete measured on any horizontal plane between pipe openings.

Except drainage structures having sumps, the bottom of structures will be channeled to provide for smooth flow through the manhole. Channels will be formed using Grade B concrete, or on straight through manhole, pipe may be laid through the manhole, the top half broken out and the voids around the lower half of the pipe filled with Grade B concrete.

12. Final Grade Adjustments - Existing Structures: Adjustment of sewer or drainage structures will apply to all final adjustments made on existing structures where the elevation of the cover is not changed by more than one (1) inch, and no more than one (1) inch vertical of the structure requires reconstruction. Each vertical foot in excess of one (1) inch will be treated as structure reconstruction.

13. Final Grade Adjustments - New Structures:

- a. Sanitary Sewers: Where manholes are outside pavements and sidewalks, the final grade adjustments will be made with precast concrete grade adjustment rings; brick construction will not be allowed except where located in paved surfaces. Grade rings will be a minimum of three (3) inches thick, reinforced with two full circles of three and one sixteenth ( $3 \frac{1}{16}$ ) of an inch in diameter steel reinforcing wire. The manhole casting frame and concrete adjustment rings will be secured to the precast cone section with a minimum of four (4) and five eighths ( $\frac{5}{8}$ ) inches in diameter cadmium coated threaded studs or bolts. All joints in the assembly will be sealed with rubber "O" ring gaskets. The maximum allowable grade adjustment using grade rings will be fifteen (15) inches. The final grade adjustment for manholes located in pavements and sidewalks will be made

with brick and mortar. A minimum of three (3) or a maximum of six (6) courses of brick will be placed on top of the precast cone section.

b. Storm Drainage Structures: Final grade adjustments may be made using either brick and mortar construction or precast concrete adjustment rings at the option of the contractor. All other provisions for grade rings and brick and mortar adjustments stated above for sanitary sewers will apply.

14. Frames and Covers: Cast iron frames and covers will be furnished and placed incidental to all proposed structures. Gray iron castings will be of the type, size, and weight specified on the drawings. The castings will conform to the requirements of MDOT Specification Section 908.05, latest revision.
15. Stubs, Connections, Bulkheads and Miscellaneous Items of Work: Where called for on the drawings, existing sewers will be connected in.

Where called for on the drawings, drop connections, bulkheads, and stubs for future sewer connections will be provided. Bulkheads will be constructed or removed as called for on the drawings.

Unless otherwise noted on the drawings, stubs will consist of one length of sewer pipe with watertight stopper bulkhead, or where approved by the engineer, a brick and mortar bulkhead. Pipe stubs will be of the same material as the sewer they connect to unless specified otherwise.

16. Infiltration Limitations: The infiltration rate for all sanitary sewers and for storm sewers, where rubber gasket joints are specified to be used, will not exceed a maximum of one hundred (100) gallons per inch diameter per mile of sewer per twenty four (24) hours. Upon infiltration in excess of the above amounts, joints will be recaulked or remade or, if necessary, the pipe will be relaid. The test will be repeated until the results show that seepage has been reduced below the above maximums. The method of testing and measurement will be approved by the DPW. The contractor will provide the necessary equipment and labor for making the tests and the cost of same will be born by the contractor.
17. Wyes and Risers: Wye branches, slants or stubs fitted with suitable stoppers will be set for each lot shown and at such other points as called for on the plans. Connection of service lead to main at 2 o'clock position.

Risers will be constructed where shown on the plans. They will be constructed of six (6)-inch ABS or plastic solid wall pipe, ASTM D-2751, latest revision, or PVC pipe conforming to the requirements of ASTM D 3034 (SDR 23.5), unless otherwise called for on the drawings. They will connect to wye branches constructed as part of the sewer proper and will be constructed as shown on the detail sheet to a height of six (6) feet below the surface of the ground, unless otherwise instructed by the City Engineer. A pipe stopper will

be placed in the top bell. Fittings and stoppers will be equipped with the allowable type of joint used on the sewer. Backfill at all risers will be carefully placed and tamped sufficiently to ensure against damage from backfill settlement. Payment at the unit bid price for risers will be made for the length of riser pipe placed.

The contractor will also furnish and place a three (3)-inch minimum diameter cedar marking post, three (3)-feet in length, to be set directly above the end of the riser or wye branch, as the case may be.

Each marker will be set so that it will be in a vertical position when the backfill is completed. The top of the marker will be 6 inches below the ground surface.

18. House Connections: The contractor will construct house connections where shown on the drawings. They will be constructed of PVC pipe conforming to the requirements of ASTM D 3034 (SDR 26) unless otherwise called for on the drawings, and approved by the City and City Engineer. A pipe stopper will be placed at the end of the connection. Pipe and stopper will be equipped with allowable type of joint used on the sewer. Payment at the unit price bid for house connections will be made for the length of house connections built, including the length of the bend.

The invert of the house connections at the point of terminus will be a minimum of eight (8) feet, six (6) inches below grade except where otherwise directed by the engineer.

The contractor will also furnish and place a three (3) inch minimum diameter cedar marking post, three (3) feet in length, to be set directly above the end of the house connection. Each marker will be set so that it will be in a vertical position when backfill is completed. The top of the marker will be six (6) inches below the ground surface.

19. Contractor Safety Requirements: Trenching operations will be conducted by the contractor in a manner, which provides safe working conditions for the workers and the public, and will protect adjacent property from damage.

Trench sides will be either cut back to the slope, as necessitated by soil and ground water conditions, which will provide stable sides, or supporting systems will be installed that can restrain the earth sides from movement. Trench supporting systems will be designed by a qualified employee of the contractor.

The contractor will employ at all times at the site of the work a qualified person who will be responsible for the safety of the work and the workmen. This individual will make all decisions relevant to the stability of the

trenches, the adequacy of all protective devices, proper operation of equipment, and all other matters related to safety.

The contractor will not store, along and next to the trench, excavated material, heavy equipment, backfill materials, sewer pipe and other construction materials that may impose too great a load on the earth and cause squeezing or caving of the earth. The contractor will always provide a safe means of emergency exit from all trench excavations.

20. Sanitary Sewer Acceptance Tests: All sewers will be subjected to low-pressure air tests, infiltration tests or exfiltration tests before acceptance by the City.

The contractor will provide all labor, tools and equipment necessary to perform the tests. All tests will be done in the presence of an inspector.

a. Low Pressure Air Tests: All sewers of twenty four (24) inches in diameter or less, where ground water level above the top of the sewer is two (2) feet or less, will be subjected to low pressure air tests. The procedure for air testing of sewers will be as follows:

The sewer line will be tested in increments between manholes. The line will be cleaned and plugged at each manhole. Such plugs will be designed to hold against the test pressure and will provide an airtight seal. One of the plugs will have an orifice through which air can be introduced into the sewer. An air supply line will be connected to the orifice. The air supply line will be fitted with suitable control valves and a pressure gauge for continually measuring the air pressure in the sewer. The pressure gauge will have minimum divisions of one tenth (0.10) PSIG and an accuracy of four one hundredths (0.04) PSIG.

The sewer will be pressurized to four (4) PSIG greater than the greatest back pressure caused by ground water over the top of the sewer pipe. At least two (2) minutes will be allowed for the air pressure to stabilize between three and one half (3 ½) and four (4) PSIG. If necessary, air will be added to the sewer to maintain a pressure of three and one half (3½) PSIG or greater.

After the stabilization period, the air supply control valve will be closed so that no more air will enter the sewer. The sewer air pressure will be noted, and the timing for the test begun. The test will not begin if air pressure is less than three and one half (3 ½) PSIG, or such other pressure as is necessary to compensate for ground water level.

When testing more than one pipe size in a test section, the minimum holding time will be computed by the City Engineer in accordance with ASTM Spec. C-828. (NCPI tables are based on text and equations from ASTM C-828)

b. Infiltration Test: All sewers more than twenty-four (24) inches in diameter will be subjected to infiltration tests. All sewers of twenty four (24) inches in diameter or smaller, where the ground water level is less than two (2) feet above the top of the sewer, will be subjected to an infiltration test.

c. Exfiltration Test: Exfiltration tests may be substituted for low pressure air tests where ground water level is less than two (2) feet above the top of the sewer and where approved by the City Engineer. Exfiltration tests will not be allowed where the external water pressure exceeds four (4) feet of Head.

For the purpose of exfiltration testing, the internal water level will be equal to the external water level plus four (4) feet as measured from the top of the highest pipe in the system being tested. This could be either a house lead or a lateral. However, the maximum total height of water above the invert of the pipe at the lower end will not exceed sixteen (16) feet. A prospective test that would exceed this sixteen (16)-foot limit should not be taken. The line under construction can be broken down to smaller sections such that the maximum head of sixteen (16) feet will not be exceeded.

The actual exfiltration or leakage from the sewer line can be measured by recording the volume of water lost over a given period of time in a stand pipe or pipes connected in the upstream and/or downstream manhole, or the upstream manhole can be used provided the test water level is below the bottom of the tapered section.

It may be necessary to add a measured amount of water during the testing time interval to maintain water in the standpipe at the specified level such that the total volume of water lost would be based upon the amount of water added and the difference in elevation of water at the end of testing converted to gallons. When the stand pipe method is used, the time interval to record the difference in elevation of the water surface will be fifteen (15) minutes minimum. When the upstream manhole method is used, the time interval will be two (2) hours minimum.

Approximately four hours should elapse after the test section is filled with water to permit trapped air to escape and to allow for maximum absorption. After such absorption and escape of air has taken place, water should be added to the specified test level and the test begun. The maximum exfiltration rate will be the same as that permitted for an infiltration test.

Within a reasonable length of time following pipe laying and backfilling, the contractor will complete the work necessary to perform testing. The contractor will perform all of the necessary preliminary tests and will make all of the necessary repairs, including the repair of all visible leaks, cracks, and retests with his or her own forces to ready the sewers for final inspection and witnessing of tests by the inspector. Immediately after the sewers have passed such preliminary tests, the contractor will notify the City Engineer at

least twenty four (24) hours in advance to arrange for final inspection and witnessing of tests.

Where ground water conditions require dewatering operations to construct sewers of 24 inches in diameter or smaller, the contractor may, at his or her option, perform preliminary air tests after backfilling and while the dewatering equipment is still operating.

Where preliminary acceptance tests have been performed shortly after sewer construction, such tests will not automatically result in acceptance of the sewer. The City will cooperate fully with the contractor in the performance of preliminary tests, but recognizes the value of such tests as an early means of only tentative evaluation of workmanship and materials. Final acceptance will not be considered until after a reasonable length of time following pipe laying and backfilling to allow as much as possible for development of the earth load on the pipe.

Manholes on sewers to be subjected to air tests will be equipped with a .one half (1/2) inch diameter galvanized capped pipe nipple extending through the manhole three (3) inches into the manhole wall and at an elevation equal to the top of the sewer pipe. Before the air test, the groundwater elevation will be determined by blowing air through the pipe nipple to clear it and then connecting a clear plastic tube to the pipe nipple. The tube will be suspended vertically in the manhole and ground water elevation determined by observing the water level in the tube. The air test pressure will be adjusted to compensate for maximum groundwater level above the top of the sewer pipe to be tested. The height of water in feet will be divided by two and three tenths (2 3/10) to determine the additional pressure to be added to all low pressure air test readings. After all tests are performed and the sewer is ready for final acceptance, the pipe nipple will be removed and the hole in the manhole wall will be plugged with hydraulic cement.

If a sewer fails to pass any of the previously described tests, the contractor will determine the location of the leaks, repair them and retest the sewer. The tests will be repeated until satisfactory results are obtained.

The method of testing and measurement will be approved by the City Engineer. The contractor will provide the necessary equipment and labor for making the tests.

Chemical or cement grouting will not be considered an acceptable method of repairing leaking pipe, joints or structural failures, except where specifically approved by the City Engineer. In this regard, the decision of the City Engineer will be final.

d. Hydrostatic Tests of Force Mains: Prior to acceptance, force mains will be flushed, inspected and hydrostatically tested as specified herein. The

contractor will furnish all necessary personnel, temporary bracing, plugs, test pumps and all other necessary apparatus for conducting the test.

Before applying test pressure, all air will be expelled from the pipe. If necessary to accomplish this, taps will be made at the points of highest elevation in the pipe and such openings subsequently closed, prior to test, with tight threaded brass plugs. Test pressure will be maintained at one hundred (100) psi at the point of highest elevation in the test section by pumping water into the pipe for two (2) hours and in all cases long enough to permit assurance of a satisfactory test. Leakage, as measured by the quantity of water pumped into the pipe to maintain 100 psi pressure during the test, will not exceed a rate of fifty (50) gallons per inch diameter of main per mile of pipe in twenty four (24) hours.

The proprietor will furnish all water used on this project including water used for hydrostatic testing. If he or she elects to purchase water from the City of Dexter, he or she will pay for the full metered amount at the current water rate for the system used.

If a meter is not available to measure the volume of water, the contractor will pay for a minimum of three (3) times the volume of the pipe installed or as otherwise determined by the City Engineer.

e. Test for Alignment: All sewers will be laid accurately to the line and grade shown on the approved plans. The sewers will be tested for alignment by shining a light through the pipe at a manhole and viewing the light from an adjacent manhole. Any section of sewer in which a light cannot be seen from one manhole to the next will be corrected to the satisfaction of the engineer to pass this test.

f. Test for Deflection of PVC Pipe: PVC pipe sewers shall be installed in such a manner that the initial deflection of the conduit shall not exceed five (5) percent of the inside diameter of the pipe. Final backfill shall be installed in such a manner that the initial deflection of the conduit shall be installed for a minimum of 30 days prior to deflection testing.

A deflection test gauge (GO, NO-Go Gauge) as manufactured by Hurco Industries, Cherne Industries, or approved equal shall be used to verify that the maximum allowable deflection standard is met. The test gauge must have a minimum of 9 points. Proving rings must be provided to verify gauge diameter. The gauge shall be pulled through manually; force will not be allowed. Pipe with deflections greater than 5% will be considered unacceptable and shall be re-laid by the proprietor.

g. Televising of Sewer: All public sewers must be televised. Test results must be approved by the City before putting the sewer in service. Copies of the videotape must be submitted to the City. The submitted videotape will be

permanently retained by the City.

## I. Air Test Tables for Sanitary Sewers

### Air Test Table for Vitrified Clay and Concrete Pipe

Specification Time (min:sec) Required for Pressure Drop from 3-1/2 to 2-1/2 PSIG When Testing One Pipe Diameter Only Pipe Diameter, Inches																
Length of Line, Feet		4	6	8	10	12	15	18	21	24	27	30	33	36	39	42
	25	0:04	0:10	0:18	0:22	0:27	0:32	0:36	0:45	0:54	1:03	1:12	1:21	1:30	1:39	1:50
	50	0:09	0:21	0:36	0:45	0:54	1:03	1:12	1:30	1:48	2:06	2:24	2:42	3:00	3:18	3:39
	75	0:14	0:32	0:54	1:08	1:21	1:34	1:48	2:15	2:42	3:09	3:36	4:03	4:30	4:57	5:29
	100	0:18	0:42	1:12	1:30	1:48	2:06	2:24	3:00	3:36	4:12	4:48	5:24	6:00	6:36	7:18
	125	0:22	0:52	1:30	1:52	2:15	2:38	3:00	3:45	4:30	5:15	6:00	6:45	7:30	8:15	9:08
	150	0:27	1:03	1:48	2:15	2:42	3:09	3:36	4:30	5:24	6:18	7:12	8:06	9:00	9:54	10:57
	175	0:32	1:14	2:06	2:38	3:09	3:40	4:12	5:15	6:18	7:21	8:24	9:27	10:30	11:33	12:47
	200	0:36	1:24	2:24	3:00	3:36	4:12	4:48	6:00	7:12	8:24	9:36	10:48	12:00	13:12	14:36
	225	0:40	1:34	2:42	3:22	4:03	4:44	5:24	6:45	8:06	9:27	10:48	12:09	13:30	14:51	16:26
	250	0:45	1:45	3:00	3:45	4:30	5:15	6:00	7:30	9:00	10:30	12:00	13:30	15:00	16:30	18:16
	275	0:50	1:56	3:18	4:08	4:57	5:46	6:36	8:15	9:54	11:33	13:12	14:51	16:30	18:09	20:06
	300	0:54	2:06	3:36	4:30	5:24	6:18	7:12	9:00	10:48	12:36	14:24	16:12	18:00	19:48	21:54
	350	1:03	2:27	4:12	5:15	6:18	7:21	8:24	10:30	12:36	14:42	16:48	18:54	21:00	23:06	25:33
	400	1:12	2:48	4:48	6:00	7:12	8:24	9:36	12:00	14:24	16:48	19:12	21:36	24:00	26:24	29:12
	450	1:21	3:09	5:24	6:45	8:06	9:27	10:48	13:30	16:12	18:54	21:36	24:18	27:00	29:42	32:51
	500	1:30	3:30	6:00	7:30	9:00	10:30	12:00	15:00	18:00	21:00	24:00	27:00	30:00	33:00	36:30

Note: Table is taken from the National Clay Pipe Institute (NCPI) tables which are based upon ASTM C828 "Test Method for Low Pressure Air Test for Vitrified Clay Pipe Lines" and ASTM C924 "Standard Practice for Testing Concrete Pipe Sewer Lines by Low Pressure Air Test Method"

## Air Test Table For PVC and ABS Pipe

### **Minimum Specified Time Required for a 1.0 PSIG Pressure Drop**

Pipe Diameter (in)	Minimum Time, (min:sec)	Length for Minimum Time, ft.	Time for Longer Length, seconds	Specified Time for Length (L) Shown, (min:sec)							
				100 feet	150 feet	200 feet	250 feet	300 feet	350 feet	400 feet	450 feet
4	3:46	597	0.380 L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	0.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41
21	19:50	114	10.470 L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33
27	25:30	88	17.306 L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48
30	28:20	80	21.366 L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15
33	31:10	72	25.852 L	43:05	64:38	86:10	107:43	129:16	150:43	172:43	193:53
36	34:00	66	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	203:46

### **For Size and Length of Pipe Indicated for Q=0.0015 \***

Note: Table is taken from ASTM F1417 "Standard Test Method for Installation and Acceptance of Plastic Gravity Sewer Lines Using Low Pressure Air Test". ASTM F1417 conforms to Uni-Bell "Recommended Practice for Low Pressure Air Testing of Installed Sewer Pipe" (UNI-B-6-98).

## **Site Plan Checklists**

### **City of Dexter Checklist for Preliminary Site Plans**

#### **General Requirements**

The following requirements apply to Preliminary Site Plans:

- ☐ 1. Plans must be submitted on 24 inch x 36 inch paper with a minimum horizontal scale of 1 inch = 20 feet and vertical of 1 inch = 2 feet for sites less than three acres or a minimum horizontal scale of 1 foot = 100 feet and vertical of 1 inch = 10 feet for sites of three or more acres.
- ☐ 2. An overall site plan at 1 inch = 100 feet or 1 inch = 200 feet needs to be submitted when the size of the site prohibits a single plan sheet. Show street names, units, utilities, pavement, site dimensions, and phase lines.
- ☐ 3. Plans must be signed and sealed by a professional engineer or architect registered in the State of Michigan. All correspondence concerning the design of the site will be directed to the engineer whose seal appears on the plan.

Preliminary Plans must include the following:

- ☐ 4. Name, address and phone number of the engineer/architect, owner and the applicant if different from the owner. Owner's signed consent is needed for preliminary site plan approval application if the applicant is not the owner.
- ☐ 5. Legal description of property, including lot number and sidwell number.
- ☐ 6. Location map showing section number and major thoroughfares.
- ☐ 7. Title block, scale, north arrow, and date for each sheet.
- ☐ 8. Provide the following information regarding zoning:
  - Existing and proposed zoning classification of property
  - Delineation of required yards
  - Dwelling unit schedule
  - Density of development
  - Lot area per dwelling unit for residential projects
  - Lot coverage percent
  - Floor area ratio
  - Location and size of required buffers
- ☐ 9. Location and area of development phases, building program by phase, and projected schedule of development by phase.
- ☐ 10. Parcel dimensions and adjoining rights-of-way.
- ☐ 11. Adjacent land uses and zoning, including any adjacent property owned by the applicant, location of adjacent buildings, drives and streets.
- ☐ 12. General topography and soils information.
- ☐ 13. Proposed building use and other uses of property including any outdoor storage areas.
- ☐ 14. Proposed building/structures, including location, outline, general dimensions, distance between buildings/structures, floor area, numbers of floors, height, number and type of dwelling units where applicable.
- ☐ 15. Proposed streets and drives, including general alignment, right-of-way, surface area and width.
- ☐ 16. Location and size of open areas and recreation areas.

- ☐ 17. Proposed parking and loading, including location and dimensions of lots, typical dimensions of spaces and aisles, angle of spaces and required number of spaces by zoning. ADA passenger loading zones shall also be shown. Adequate room for turning movements must be provided.
- ☐ 18. Location and width of all existing and proposed easements on the site or adjacent to the site.
- ☐ 19. General location and size of all utilities (water, sanitary, storm); location of overhead wires and poles.
- ☐ 20. Areas of intended grading; outline of existing structures and drives; existing natural and manmade features to be retained or removed.
- ☐ 21. Walls or berms, as required by zoning, must be shown in cross-section. Walls separating a grade differential of more than 18 inches are considered retaining walls and require a structural engineering design and review. Design engineer must supply calculations with final site plan submittal.
- ☐ 22. Existing and proposed plantings and landscaping shown in accordance with zoning requirements.

## **Topographical Survey**

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The topographical survey must include the following:

- ☐ 1. USGS benchmarks (minimum of two) using NAVD 88.
- ☐ 2. Property lines indicated by bearing and distance.
- ☐ 3. Existing offsite elevations at 2-foot intervals at a minimum of 100 feet around the property.
- ☐ 4. Elevations at property corners and along property lines and sufficient onsite elevations or contours to establish site drainage.
- ☐ 5. Existing natural or manmade features to be removed or retained, including but not limited to; ditches, culverts, utilities (invert and casting elevations), sidewalks, utility poles, easements, finish grade of adjacent buildings, trees, wetlands, ponds, structures, driveways and curb cuts.
- ☐ 6. Adjacent roads with existing and future rights-of-way per the Master Plan.
- ☐ 7. Grades must be shown on both sides of the road at ditch centerline, top of bank, edge of shoulder, edge of pavement or top of curb and pavement centerline.

(This must be shown on the final site plan and may be necessary for the preliminary site plan stage).

## **Water Main**

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- ☐ 1. Minimum size water main is eight (8) inches. Maximum dead-end main lengths are: 40 feet for a 6-inch fire hydrant lead; 450 feet for an 8-inch main; 1000 feet for a 12-inch main.
- ☐ 2. All mains must end with a gate valve then a hydrant or blow-off.
- ☐ 3. Show water service location, type and size. No private services are allowed from a 6-inch hydrant lead or mains over 16 inches in diameter.
- ☐ 4. A 10-foot horizontal separation and an 18-inch vertical separation must be maintained between the water main and sanitary or storm sewers.
- ☐ 5. If public water main is on private property a minimum 12-foot-wide easement must be provided.
- ☐ 6. Valve spacing:

In case of a breakage: Three (3) valves to isolate break, no more than two (2) hydrants out of service; no more than 30 single family units or 30 multiple units out of service. For major commercial and industrial developments, building service must be maintained from a looped system with valves and wells on either side of the building service.

- ☐ 7. No Parking within ten (10) feet of a hydrant.
- ☐ 8. Fire Department will comment of hydrant locations.
- ☐ 9. Plans must conform to Fire Department Guidelines and Section 3.E of these standards.
- ☐ 10. In areas where no water main exists, water main must be proposed across property frontage or to a property line, as directed by the City and City Engineer.
- ☐ 11. Where possible, avoid placing water main under pavement.

## **Sanitary Sewer**

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- ☐ 1. Where public sanitary sewer is proposed outside of the right-of-way, a sanitary sewer easement, with a minimum width of 20 ft must be provided. If sewer is deeper

than 10ft, additional easement width may be needed. The easement must be shown on the plans.

- ☐ 2. In areas where no sanitary sewer exists, sanitary sewer must be extended across the frontage or to a property line as directed by the City engineer.
- ☐ 3. Show size and location of proposed sewers and building service leads.

## **Storm Sewer**

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- ☐ 1. Proposed collection points, system layout, sizes and outlets must be shown on the site plan.
- ☐ 2. Minimum twelve (12) foot wide easement must be provided for public storm sewer. It must be shown on the plans. Additional width may be required depending on the depth of the sewer.

## **Storm Water Treatment**

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- ☐ 1. Supply preliminary storm water treatment calculations, including the first flush volume, bankfull volume, and 100-yr detention volume, for site plan review per City requirements. Show that sufficient room exists on site to provide for the appropriate amount of storm water treatment.
- ☐ 2. Acceptable means are Best Management Practices, including underground infiltration or storage, oversized storm pipes, and a separate detention or retention basin.

## **Site Grading**

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- ☐ 1. Sufficient proposed grades must be provided to ensure that:
  - a. Drainage is adequately discharged offsite with proper detention.
  - b. No upstream drainage is restricted.
  - c. Paving slopes are adequate.
  - d. The site generally drains without standing water.
  - e. Adjacent property will not be adversely impacted.
- ☐ 2. Elevation representing the brick ledge, finished grade, and the first floor grade must be indicated.
- ☐ 3. Proposed grading will meet abutting property line elevations. Differentials in grade must incorporate a one (1) vertical to four (4) horizontal maximum slope to the abutting property line.

- ☐ 4. An easement from the adjacent property owner will be required for any grading necessary on offsite property at the time of final site plan submittal.

## **Paving and Right-of-Way Improvements**

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- ☐ 1. Onsite paving requirements:
  - a. Minimum drive widths and parking lot dimensions per standard details.
  - b. Utility structures shall be placed outside of the driveway and paved areas, where possible.
  - c. All private roadways and parking lots must have concrete curb and gutter except in zoning districts classified as Research and Development (RD) with City approval.
- ☐ 2. Public right-of-way, (City):
  - a. Right-of-way layout must be shown, including:
    - 1. Appropriate right-of-way width.
    - 2. Right-of-way cross-section shown, including pavement width, curb and gutter (if necessary) and sidewalk locations.
  - b. All roads must have curb and gutter unless otherwise approved by the City.
  - c. Passing lane, acceleration lane and taper, deceleration and taper as required by the Department of Public Services.
  - d. Shoulder requirements (uncurbed roads): Local road six (6) inches – 22A gravel, five (5) foot wide restored with grass.
- ☐ 3. Dedication of right-of-way along frontage to the ultimate right-of-way shall be shown.
  - a. Major road: One hundred twenty (120) feet.
  - b. Collector road: Eighty-six (86) feet.
  - c. Local Road: Sixty-six (66) feet or sixty (60) feet (residential areas only).
- ☐ 4. Sidewalks are required along the property frontage of all lots, as referenced in the most current City of Dexter Master Plan. Sidewalks must meet the standards noted in Section VI.F: Sidewalks.

## **City of Dexter Checklist for Final Site Plans**

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Final Site Plans must include all the checklist items of preliminary site plans and those requirements listed below:

### **General Requirements**

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- ☐ 1. Plans must be submitted on 24" x 36" white paper with a minimum horizontal scale of 1 inch = 50 feet and vertical of 1 inch = 5 feet. Other acceptable scales are 1 inch = 20 feet, 1 inch = 30 feet and 1 inch = 40 feet.

- ☐ 2. An overall site plan at 1 inch = 100 feet or 1 inch = 200 feet needs to be submitted when size of site prohibits a single plan sheet. Show street names, units, utilities, pavement, site dimensions, phase lines, lot lines and lot numbers.
- ☐ 3. Plans must be signed and sealed by a professional engineer or architect registered in the State of Michigan. All correspondence concerning the design of the site will be directed to the engineer whose seal appears on the plan.

Final Plans must include the following:

- ☐ 4. Legal description of property, including lot number or sidwell number, parcel dimensions and adjoining rights-of-way.
- ☐ 5. City of Dexter standard notes, including water, sewer, storm and landscaping.
- ☐ 6. Location map showing section number and major thoroughfares.
- ☐ 7. Name, address and phone number of the engineer/architect, owner and the applicant, if different from the owner. Owner's signed consent is needed for application if the applicant is not the owner.
- ☐ 8. Title block, scale, north arrow, and date for each sheet with a summary of each particular sheet.
- ☐ 9. It must be shown that adequate sight distance exists at each point of entry to the site.
- ☐ 10. Provide the following information regarding zoning:
  - a. Existing and proposed zoning classification of property
  - b. Delineation of required yards
  - c. Dwelling unit schedule
  - d. Density of development
  - e. Lot area per dwelling unit for residential projects
  - f. Lot coverage percent
  - g. Floor area ratio
  - h. Location and size of required buffers
  - i. Total ground floor area
- ☐ 11. Adjacent land uses and zoning, including and adjacent property owned by the applicant, location of adjacent buildings, drives, streets, parking lots, and other improvements on adjacent properties.
- ☐ 12. Proposed buildings/structures, within the location referenced to property lines or a common base point, including, location, exterior dimensions, distances between

buildings, height in feet and stories, first floor, floor area, finished grade, brick ledge elevations, number and type of dwelling units where applicable.

- ☐ 13. Proposed parking and loading, including location and dimensions of lots, typical dimensions of spaces and aisles, angle of spaces and required number of spaces by zoning. ADA loading zones shall be shown. Adequate room for turning movements must be provided.
- ☐ 14. Locations of proposed trash container enclosures, size, typical elevation, and vertical section of enclosures showing materials and dimensions. Requirements per Waste Management are included in the Appendix.
- ☐ 15. Location and type of proposed screens and fences, including height, typical elevation and vertical section showing materials and dimensions.
- ☐ 16. Location, type, size, area and height of proposed signs.
- ☐ 17. Location, type, direction and intensity of outside lighting.
- ☐ 18. Location and size of open areas and recreation areas.
- ☐ 19. Landscape plan showing location, size of plant materials, and standard notes. No trees are permitted within 6 ft of a utility.
- ☐ 20. Walls or berms, as required by zoning, must be shown in cross-section. Walls separating a grade differential of more than 18 inches are considered retaining walls and require a structural engineering design and review. Design engineer must supply calculations with engineering plan submittal.
- ☐ 21. The storm sewer, sanitary sewer and water main will be shown on the same plan view.
- ☐ 22. Plan and description of measures to control soil erosion and sedimentation during grading and construction operations until a permanent ground cover is established.
- ☐ 23. A traffic study must be provided to the City Engineer for review. Exceptions will be only allowed with written permission from the City Engineer.
- ☐ 24. Sufficient information to show that the latest standards of the American with Disabilities Act is being met.

## **Topographical Survey**

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The following information needs to be shown on the topographical survey:

- ☐ 1. USGS Benchmark, (minimum of two). All elevations must be to NAVD 88.

- ☐ 2. Property lines by bearing and distance.
- ☐ 3. Existing natural conditions, including trees, wooded areas, streams, marshes, ponds, and other wetlands. Clear indication of all natural features to remain and to be removed. All trees 8 inches in diameter or larger will be accurately located on the final site plan and labeled as to be either preserved or removed. Replacement requirements should be noted.
- ☐ 4. Existing offsite elevations at a minimum of 50 feet intervals around the property. Elevations at property corners and along property lines and sufficient onsite elevations or contours to establish site drainage.
- ☐ 5. Existing improvements shown. Any buildings, structures and other improvements, including drives, ditches, culverts, bridges, utilities (invert and casting elevations), sidewalks, utility poles and towers, easements, pipelines and finish grade of adjacent buildings. Clear indication of all improvements to remain and to be removed.
- ☐ 6. Show existing adjacent roads with both existing right-of-way and future right-of-way per the Master Plan. Grades must be shown at ditch centerline, top of bank, edge of shoulder, edge of pavement or top of curb and pavement centerline. Grades must be shown on both sides of road.

## **Water Main**

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The following information needs to be shown as part of the water main design:

- ☐ 1. City of Dexter Standard Notes and Details (see Appendix) provided on the plans.
- ☐ 2. A quantity list and basis of design must be shown on cover sheet of the plan set.
- ☐ 3. Minimum size water main is 8 inches. Maximum dead-end main lengths are 40 feet for a 6-inch fire hydrant lead, 450 feet for an 8-inch main, 1000 feet for a 12-inch main. All mains must end with a gate valve then a hydrant or blow-off.
- ☐ 4. Show water service and size. No private services are allowed from a 6-inch hydrant lead or mains over 16 inches in diameter.
- ☐ 5. Where water main is next to the right-of-way, a water main easement must extend across the front of a property line as directed by the City Engineer.
- ☐ 6. Profiles are required on all water mains. Include the following information:
  - a. Length, size, type, and class of pipe.
  - b. Top of casting elevation on gate wells.
  - c. Special backfill areas, i.e., sand.
  - d. Utility crossings.
  - e. Existing and proposed ground elevations.

- ☐ 7. Minimum 10-foot horizontal separation between the water main and sanitary or storm sewer.
- ☐ 8. Minimum 18-inch clearance between water main and storm or sanitary sewer. Top of water main and sewer invert indicated.
- ☐ 9. Pipe size, length and type shown in plan view.
- ☐ 10. Water main shall be Ductile Iron class 54.
- ☐ 11. Tapping sleeve and valve used to connect to existing mains unless connection can be made without interrupting service on the main.
- ☐ 12. Minimum 12-foot-wide easement must be shown on the plans.
- ☐ 13. Valve spacing:  
In case of a breakage: Three valves to isolate break, four maximum, no more than two hydrants out of service; no more than 30 single family units or 30 multiple units out of service. For major commercial and industrial developments, building service must be maintained from a looped system with valves and wells on either side of the building service.
- ☐ 14. Hydrant spacing: see Hydrant Coverage.
- ☐ 15. No parking within 10 feet of a hydrant.
- ☐ 16. Fire Department will comment on hydrant locations. A note shall be provided on the plans indicating that hydrants shall be provided with a Storz connection.
- ☐ 17. Plan must conform to Fire Department Guidelines. Proposed Knox Box shall be shown on the plans.
- ☐ 18. Public water main must obtain a Permit for Water Supply Systems (Act 399) from the Michigan Department of Environmental Quality.
- ☐ 19. For new subdivisions, water service shall be shown for each lot, and provided at the center of the lot.

## **Sanitary Sewer**

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The following information needs to be shown as part of the sanitary sewer design:

- ☐ 1. City of Dexter Standard Notes and Details (see Appendix) provided on the plans.
- ☐ 2. Quantity list and basis of design data must be shown on plan. The existing and proposed residential equivalent units (REU's) must be shown on the plans in

accordance with the City's most current Tap Fee Resolution. If a connection unit factor is not provided in the Tap Fee Resolution that coincides with the development type, the applicant shall develop their own connection unit factors and provide a basis for their determinations for City approval.

- ☐ 3. Where sanitary sewer is next to the right-of-way, a sanitary sewer easement must be extended across the front or to a property line as directed by City Engineer.
- ☐ 4. Minimum 20-foot easement for public sewer must be shown on the plans. Additional width may be needed due to depth of sewer.
- ☐ 5. External drop connection required when there is an 18-inch vertical difference between inverts on outlet and inlet pipes.
- ☐ 6. Internal drop connections must be approved by DPW or governing agency. They are not allowed under current policy.
- ☐ 7. Show building lead type, size, location and invert elevation at building and finish grade of building. Check conflict in elevation with other utilities. Minimum 4-inch diameter at a 2 percent slope or a 6-inch diameter at a 1 percent slope.
- ☐ 8. Sewer to be constructed per the following sewer size, grade and manhole spacing table:

Size	Standard Grade Percent	Minimum Grade Percent	Maximum Grade Percent	Standard Run Feet	Maximum Run Feet
8 inches	0.80	0.40	8.0	300	400
10 inches	0.60	0.30	6.2	300	400
12 inches	0.40	0.22	6.0	400	450
15 inches	0.24	0.16	3.6	500	500
18 inches	0.18	0.12	2.8	600	600
21 inches	0.14	0.10	2.2	600	600

- ☐ 9. The following must be shown in plan view:
  - a. Length between structures.
  - b. Type, class and size of pipe.
  - c. Slope of sewer.
  - d. Top of casting elevation.

- e. Easement where required.
  - f. Progressive numbering system.
  - g. Invert elevations if sewer is not also shown in profile.
- ☐ 10. Profiles must be shown for sewers and services over 8 inches in diameter and larger with the following information:
- a. Length, type, class, size and slope of pipe between manholes.
  - b. Top of casting and sewer invert elevations at all manholes.
  - c. Existing and proposed ground elevations.
  - d. All utility crossings.
  - e. Special backfill areas, i.e., sand.
  - f. Provisions for infiltration testing.
  - g. Progressive numbering system.
- ☐ 11. For new subdivisions, show the sanitary service for each lot. The sanitary service shall be placed in the center of the lot.

## **Storm Sewer**

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The following information needs to be shown as part of the storm sewer design:

- ☐ 1. City of Dexter standard notes and details included.
- ☐ 2. Design calculations with hydraulic grade line computed. Attempt to keep the hydraulic grade line within pipe.
- ☐ 3. Design of storm sewer shall be as follows:
  - a. Use the Rational Method,  $Q = CIA$ , for a 10-year storm event with  $I = 175/(T+25)$  and an initial  $T = 20$  minutes, maximum.
  - b. Composite runoff coefficient,  $C$ , shall be based on the sum of the percentages of each drainage district covered by impervious and pervious areas multiplied by the respective coefficients listed below,  $C$ :
    - Residential:
      - Single family residential: 0.50
      - Multiple Family: 0.70
    - Commercial: 0.85
    - Agricultural: 0.20
    - Downtown: 0.90
  - c. Velocity for flow in the pipe will be a minimum equal to 2.5 feet per second and a maximum of 10 feet per second.
  - d. Use Manning equation for pipes flowing full.
  - e. Storm district drainage map needs to be provided
  - f. Upstream drainage needs to be accommodated.
  - g. Discharge is not allowed to be diverted onto adjoining properties.

- h. Storm Water Treatment as required.
- ☐ 4. The following must be shown in plan view:
  - a. Length between structures.
  - b. Type, class and size of pipe.
  - c. Slope of sewer.
  - d. Top of casting elevation.
  - e. Easement where required.
  - f. Progressive numbering system on structures.
  - g. Invert elevations for sewers not also shown in profile.
- ☐ 5. Private storm sewers for developments larger than one acre and all public storm sewers must be shown in profile. The following must be shown in profile:
  - a. Length, type, class, size and slope of pipe between manholes.
  - b. Top of casting and sewer invert elevations at all manholes.
  - c. Existing and proposed ground elevations.
  - d. All utility crossings.
  - e. Special backfill areas, i.e., compacted sand backfill.
  - f. Progressive numbering system on structures.
- ☐ 6. Connections at storm structures.
  - a. Roof drains must be connected at a structure.
  - b. Sump pump discharge connected via a 4-inch minimum pipe.
- ☐ 7. Private sewer requirements:
  - a. Provide profile for sites larger than one acre.
  - b. 12-inch minimum pipe size.
  - c. Catch basins/inlets at upstream end will be a minimum of 24 inches in diameter.
  - d. Catch basins with an inlet pipe will be a minimum of 48 inches in diameter.
  - e. First structure upstream of the public system will be a minimum of 48 inches in diameter with a 24-inch sump.
  - f. Minimum cover of 3 feet based on low head structures.
- ☐ 8. Public sewer requirements: Public sewers are any sewers that accept runoff from abutting property or public right-of-way.
  - a. Must be shown in profile.
  - b. 12-inch minimum pipe size.
  - c. 48-inch minimum diameter for manholes and catch basins.
  - d. 24-inch minimum diameter for inlets.
  - e. Minimum cover of 3 feet based on low head structure.

- f. Located in public right-of-way or 12-foot minimum easement.
- g. Class IV RCP C-76 must be used for public sewers and private sewers under influence of roadway.

## **Storm Water Treatment**

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The following information needs to be shown as part of the storm water treatment design:

- ☐ 1. Must be designed per current City requirements.
- ☐ 2. Acceptable means are: Best Management Practices, underground infiltration and storage, oversized storm pipes, detention basin, retention basin.
- ☐ 3. Allowable discharge to be determined by one of the following:
  - a. Discharge approved by agency having jurisdiction over outlet, i.e., county drain office or county road sewer, (approval must be submitted).
  - b. S.C.S. Technical Release No. 55 "Urban Hydrology for Small Water Sheds," (calculations must be provided). Allowable discharge could not exceed existing discharge determined.
  - c. Allowable flows designed into the outlet, (previous calculations must be submitted).
- ☐ 4. Detention basin requirements are as follows:
  - a. Fenced if side slopes exceed one on five.
  - b. Fences must be a minimum 6 feet high and chain link with an 8-foot access gate.
  - c. Side slope one on three maximum.
  - d. Must drain entirely unless basin is part of overall landscaping plan.
  - e. Bottom must be sodded.
  - f. Minimum bottom slope of one (1) percent
  - g. Minimum 12-inch freeboard provided above 100-year high water level.
  - h. Non-erodible overflow capable of handling a 100-year storm.
  - i. Sedimentation forebay must be provided.
  - j. A maintenance schedule for the storm water treatment systems must be provided on the plans.
  - k. Maintenance agreement with City must be executed and recorded with the County Register of Deeds.

## **Site Grading**

---

The following information needs to be shown as part of the site grading design:

- ☐ 1. Show sufficient proposed grades to ensure that:
  - a. Drainage is adequately discharged offsite with proper detention.
  - b. No upstream drainage is restricted.

- c. Paving slopes are adequate.
- d. The site drains without standing water.
- ☐ 2. Elevations representing the brick ledge, finished grade and the first floor grade must be indicated.
- ☐ 3. Proposed grading will meet abutting property line elevations. Differentials in grade must incorporate a one on four maximum slope to the abutting property line.
- ☐ 4. Any wall separating a differential grade of more than 18 inches will be considered a retaining structure and requires a structural engineering design and review. Design engineer must supply design calculations.
- ☐ 5. Easement from adjacent property owner will be required for any grading necessary on offsite property at time of engineering plan submittal.

### **Paving and Right-of-Way Improvements**

---

The following information needs to be shown as part of the pavement design and right-of-way improvements:

- ☐ 1. Standard paving details as necessary.
- ☐ 2. Onsite paving requirements:
  - a. Pavement cross-section must be shown. The minimum cross-sections shall be provided as noted in Section VI.B.
  - b. Minimum slope:
    - Asphalt: 1 percent.
    - Concrete: 0.5 percent.
  - c. Maximum Slope:
    - Asphalt: 6 percent.
    - Concrete: 6 percent.
    - Note that the most current ADA guidelines must be met for accessible areas.
  - d. Minimum drive widths and parking lot dimensions per standard details, (see Appendix).
  - e. Adequate sight distance must be provided at the driveways.
  - f. All private roadways and parking lots must have concrete curb and gutter.
  - g. Sufficient room for turning movements must be provided on the plans through the use of turning templates for appropriate design vehicles.
- ☐ 3. Public right-of-way (City) Requirements
  - a. Sufficient proposed grades to show drainage patterns (50-foot maximum spacing).
  - b. Pavement cross-section must be shown. The minimum cross-sections are noted in Section VI.B:

- c. All public roads must have curb and gutter unless otherwise approved by the City.
  - d. Passing lane, acceleration lane and taper, deceleration lane and taper as required by the City Engineer. The City references the requirements of the Washtenaw County Road Commission in requiring passing lanes, acceleration lanes and tapers, and deceleration lanes and tapers.
  - e. Shoulders must be provided on uncurbed roads. Shoulders will be 2 feet wide made up of 6 inches of 22A gravel
- ☐ 4. Dedication of right-of-way along frontage to the ultimate right-of-way shown. See Map in the Appendix.
  - a. Major road: One hundred twenty (120) feet.
  - b. Collector road: Eighty-six (86) feet.
  - c. Local road: Sixty-six (66) feet or sixty (60) feet (residential areas only).
- ☐ 5. The following requirements apply to drainage swales:
  - a. Must provide adequate culvert capacity.
  - b. Enclosure of swales is generally not permitted (other than for driveways where a culvert is provided).
  - c. Side slopes are 1:3 maximum.
  - d. 2-foot-wide swale bottom.
- ☐ 6. Sidewalks are required along the frontage of all roads. See Section VI:F: Sidewalks for sidewalk standards.

# APPENDIX A

## DESIGN DOCUMENTS

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## OFFICE OF COMMUNITY DEVELOPMENT

8140 Main Street • Dexter, Michigan 48130-1092 • (734) 580-2233 • Fax (734) 426-5614

### SITE PLAN REVIEW & SPECIAL USE APPLICATION

File #: \_\_\_\_\_

Date Submitted: \_\_\_\_\_

**Application for (check box)**

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

Administrative Site Plan Review  
Preliminary Site Plan Review  
Final Site Plan Review  
Combined Site Plan Review

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

Special Land Use Review  
Amendment to Approved Site Plan  
Amendment to Special Land Use Approval  
Amendment to Approved Master Deed

*An application for Site Plan and/or Special Land Use Review must be submitted to the Office of Community Development at least thirty days prior to the Planning Commission/City Council meeting at which the proposal will be considered. The application must be accompanied by the application data requirements set forth in the City of Dexter Zoning Ordinance, including fully dimensioned site plans, plus the required review fees. Regular meetings of the Planning Commission are held the first Monday of the month at 7:00 pm. Regular meetings of the City Council are held the second and fourth Monday of the month at 7:30 pm. All meetings are held at the Dexter Senior Center, 7720 Ann Arbor Street, Dexter, MI 48130.*

I (We), the undersigned, do hereby respectfully request consideration of our Planned Unit Development Application and provide the following information to assist in the review:

Project Name:

Applicant:

Mailing Address:

Telephone (Office):

Telephone (mobile):

Email Address:

Property Owner(s) (if different from Applicant):

Mailing Address:

Telephone (Office):

Telephone (mobile):

Email Address:

Applicant's Legal Interest in the Property:

**Property Location:**

Address:

Property ID Number:

## Application for Site Plan and/or Special Use- Page 2

### Property Description:

If all or part is a recorded plat, provide lot numbers and subdivision name. If all or part is a condominium, provide unit numbers and condominium name. If all or part of the property is not part of a recorded plat (i.e., acreage parcel), provide metes and bound description. Attach separate sheet, if necessary.

Property Size (Acreage):

Square Feet:

Current Zoning:

Current Use of Property:

Proposed Use of Property (Specify number of acres to be allocated to each use):

Describe Amendment to Approved Site Plan/Special Land Use Approval:

Is the property located within a Wellhead Protection Area?

\_\_\_\_\_ Yes \_\_\_\_\_ No

Please provide the following information, as applicable to the proposal:

Type of Development	Number of Units	Gross Floor Area	Number of Employees on Largest Shift
Detached Residential			
Attached Residential			
Office			
Commercial			
Industrial			
Other			

Site Data	Required	Submitted
Lot Area (sq. ft.)		
Lot Width (ft.)		
Height (stories/ft.)		
Front Yard Setback (ft.)		
Side Yard Setback (ft.)		
Rear Yard Setback (ft.)		
Lot Coverage (%)		
Floor Area (per unit in sq. ft.)		
Number of Units (Residential)		
Multi-Family:		
Efficiency		
1 Bedroom		
2 Bedroom		
3 bedroom or more		
Parking		

**Additional Information Required for Special Use Review:**

1. Statement describing the use proposed. This should include information about the hours of operation, number of employees and clients, type of programming or services, traffic expected to be generated, and any other pertinent information and/or site development characteristics.
2. All applications are presented to the Planning Commission at a public hearing for a recommendation prior to begin forwarded to the City Council for final consideration. Therefore, all applications must be submitted four weeks prior to 1st Monday of month in order to ensure proper notice time and preparation time. Incomplete applications cannot be processed.

---

**Professionals who prepared the plans:**

A. Name:

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Mailing Address:

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Telephone (Office):

Telephone (mobile):

---

Email Address:

---

Design Responsibility (engineer, surveyor, architect, etc.):

---

B. Name:

---

Mailing Address:

---

Telephone (Office):

Telephone (mobile):

---

Email Address:

---

Design Responsibility (engineer, surveyor, architect, etc.):

---

C. Name:

---

Mailing Address:

---

Telephone (Office):

Telephone (mobile):

---

Email Address:

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Design Responsibility (engineer, surveyor, architect, etc.):

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## Application for Site Plan and/or Special Use- Page 4

### Submit the Following:

1. Sixteen (16) individually folded copies of the site plans (5 for administrative review), measuring 24" x 36", sealed by a registered architect, engineer, landscape architect, or community planner, plus one (1) 11" x 17" copy of the site plans.
2. Sixteen (16) 11" x 17" copies of color renderings of building elevations, if applicable, and floor plans (5 for administrative review).
3. A PDF file of the site plan, including building elevations and floor plans.
4. A written description of the proposed use with an explanation of how approval of the Planned Unit Development will produce exception benefits for the community.
5. Proof of ownership (title insurance policy or registered deed with County stamp)/
6. Review comments or approval received from County, state, or federal agencies that have jurisdiction over the project, including, but not limited to:

Washtenaw County Road Commission	Washtenaw County Environmental Health Division
Washtenaw County Water Resources Commission	Michigan Dept. of Natural Resources
Michigan Dept. of Environmental Quality	Michigan Dept. of Transportation

**Please note:** The applicant, or a designated representative **MUST BE PRESENT** at all scheduled meetings, or the case may be postponed due to lack of representation. Failure to provide true and accurate information on this application shall provide sufficient grounds to deny approval of a Planned Unit Development application or to revoke any permits granted subsequent to the site plan approval.

### Applicant's Endorsement:

All information contained herein is true and accurate to the best of my knowledge. I acknowledge that my application will not be reviewed unless all required information for this application has been submitted. I further acknowledge that the City and its employees shall not be held liable for any claims that may arise as a result of acceptance, processing, or approval of this application.

\_\_\_\_\_  
Signature of Applicant

\_\_\_\_\_  
Date

\_\_\_\_\_  
Applicant Name (Print)

\_\_\_\_\_  
Signature of Applicant

\_\_\_\_\_  
Date

\_\_\_\_\_  
Applicant Name (Print)

\_\_\_\_\_  
Signature of Property Owner Authorizing Application

\_\_\_\_\_  
Date

\_\_\_\_\_  
Property Owner Name (Print)

*For Office Use Only*

		Non-Refundable Fee	Review Escrow	Amt. /Date Pd. /Receipt #
	Administrative	\$350 + \$50/ac	\$3,000	
	Preliminary Site Plan Review	\$600 + \$50/ac	\$3,000	
	Final Site Plan Review	\$900 + \$50/ac	\$3,000	
	Combined Site Plan Review	\$1,100 + \$50/ac	\$3,000	
	Special Land Use	\$350 + \$50/ac	\$3,000	
	Amendment to Approved Site Plan, Special Land Use and/or Master Deed	\$300	\$3,000	

Public Hearing \_\_\_\_\_ Date: \_\_\_\_\_

Administrative Action \_\_\_\_\_ Date: \_\_\_\_\_

Planning Commission Action \_\_\_\_\_ Date: \_\_\_\_\_

City Council Action \_\_\_\_\_ Date: \_\_\_\_\_

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CONDITIONS OF APPROVAL: \_\_\_\_\_

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REASONS FOR DENIAL: \_\_\_\_\_

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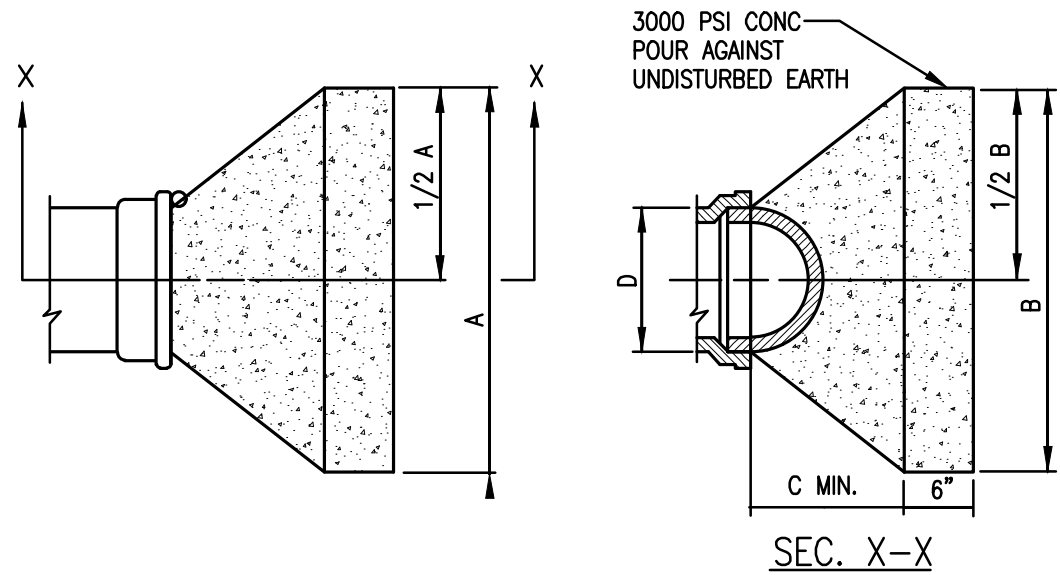
APPROVAL STAMP

## City of Dexter Standard Notes

1. Notify the City of Dexter and the City Engineer a minimum of 72 hours prior to the start of construction.
2. All construction must conform to the current engineering standards and specifications adopted by the City of Dexter.
3. No paving or excavation for paving shall be allowed until the sanitary sewers, water main storm sewers and/or country drain clean out construction has been approved by the City.
4. Call MISS DIG (800-482-7171) a minimum of 72 hours prior to the start of construction.
5. All soil erosion and silt must be controlled and contained onsite prior to the start of construction.
6. All excavation under the influence of pavement, including sidewalks and driveways, existing or proposed, shall be backfilled and compacted with Class II sand to 95% of maximum unit weight.
7. The contractor is responsible for all damage to existing utilities.
8. The contractor is responsible for restoring all disturbed areas to the conditions that existed prior the start of construction.
9. Working hours (including running of any machinery) shall be restricted to Monday through Saturday, 7:00 am to 7:00 pm; or sunup to sundown; whichever is less.

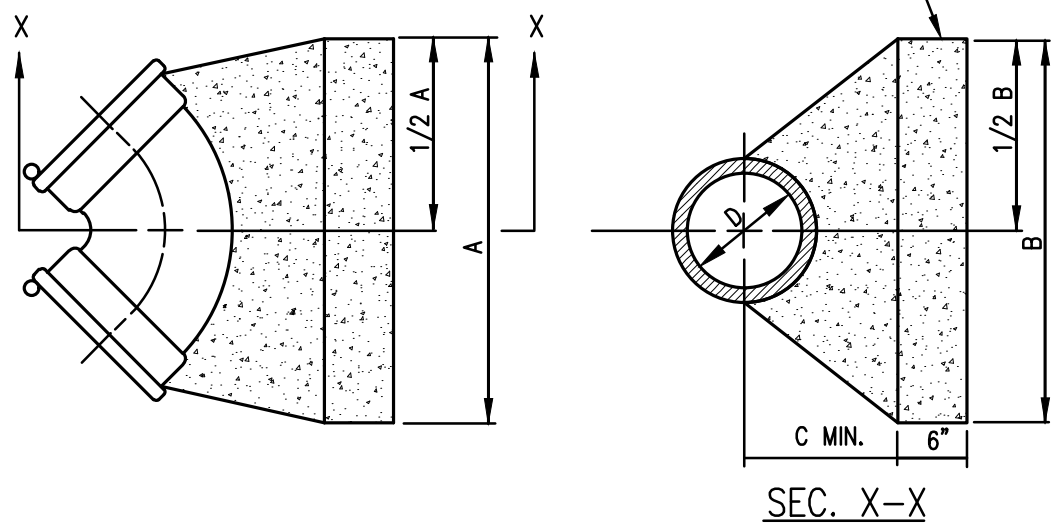
DRAWING PATH: S:\CUT\ Dexter\ Villages\Standards\CADD\2018\Dexter\_Villages.dwg    Feb 07, 2019 - 3:13pm

DIA. OF WATER MAIN		THRUST BLOCK		
D	A	B	C	
6"	18"	18"	9"	
8"	2'0"	2'0"	12"	
12"	3'0"	3'0"	15"	
16"	4'0"	4'0"	18"	



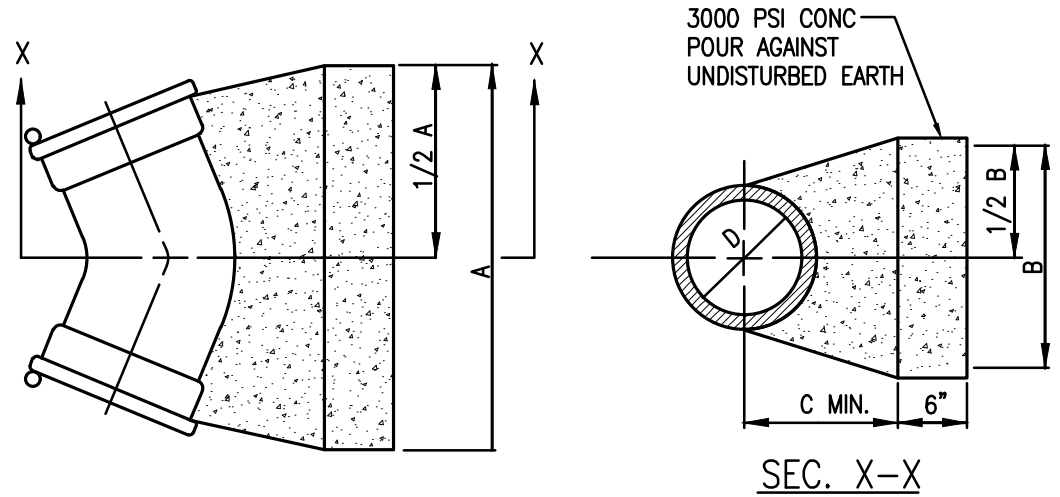
THRUST BLOCK AT PLUG

DIA. OF WATER MAIN		THRUST BLOCK		
D	A	B	C	
6"	2'0"	18"	9"	
8"	2'9"	2'0"	12"	
12"	4'0"	3'0"	15"	
16"	5'6"	4'0"	18"	



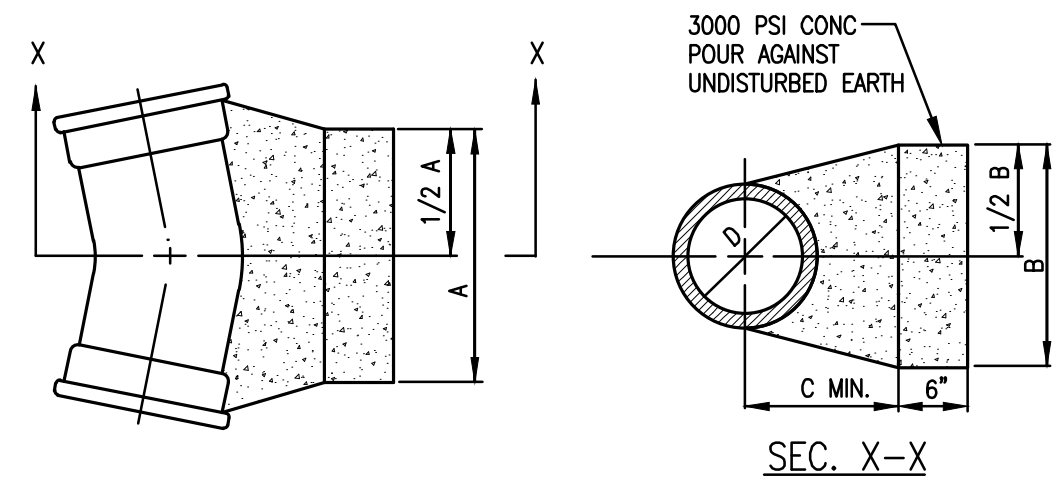
THRUST BLOCK AT 90° BEND

DIA. OF WATER MAIN		THRUST BLOCK		
D	A	B	C	
8"	2'0"	18"	15"	
12"	3'3"	2'0"	18"	
16"	4'0"	3'0"	21"	



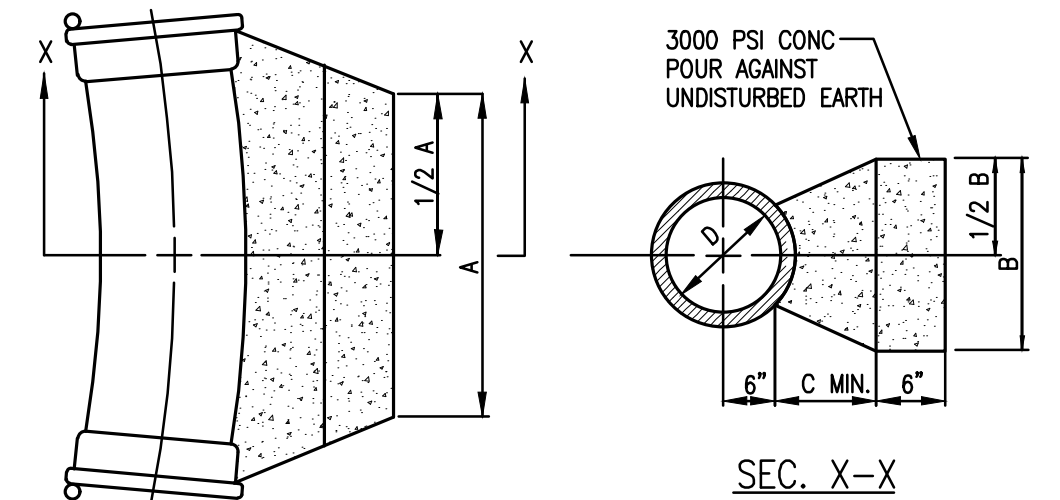
THRUST BLOCK AT 45° BEND

DIA. OF WATER MAIN		THRUST BLOCK		
D	A	B	C	
12"	2'0"	21"	18"	
16"	3'0"	2'0"	21"	



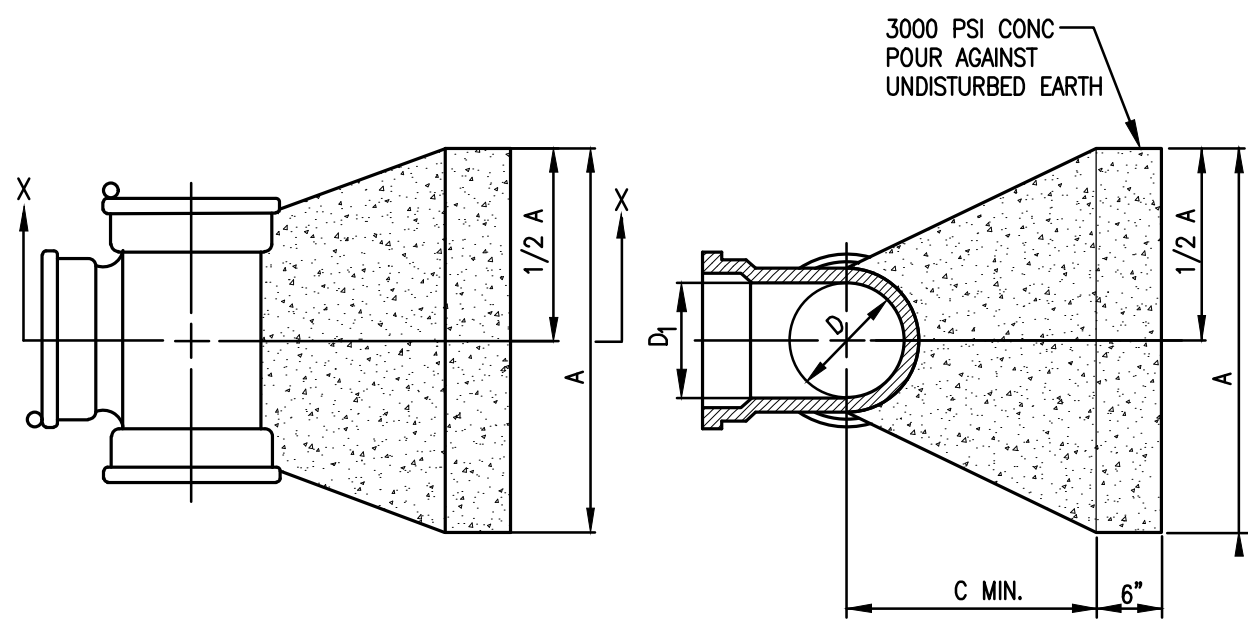
THRUST BLOCK AT 22 1/2° BEND

DIA. OF WATER MAIN		THRUST BLOCK		
D	A	B	C	
16"	2'0"	18"	12"	

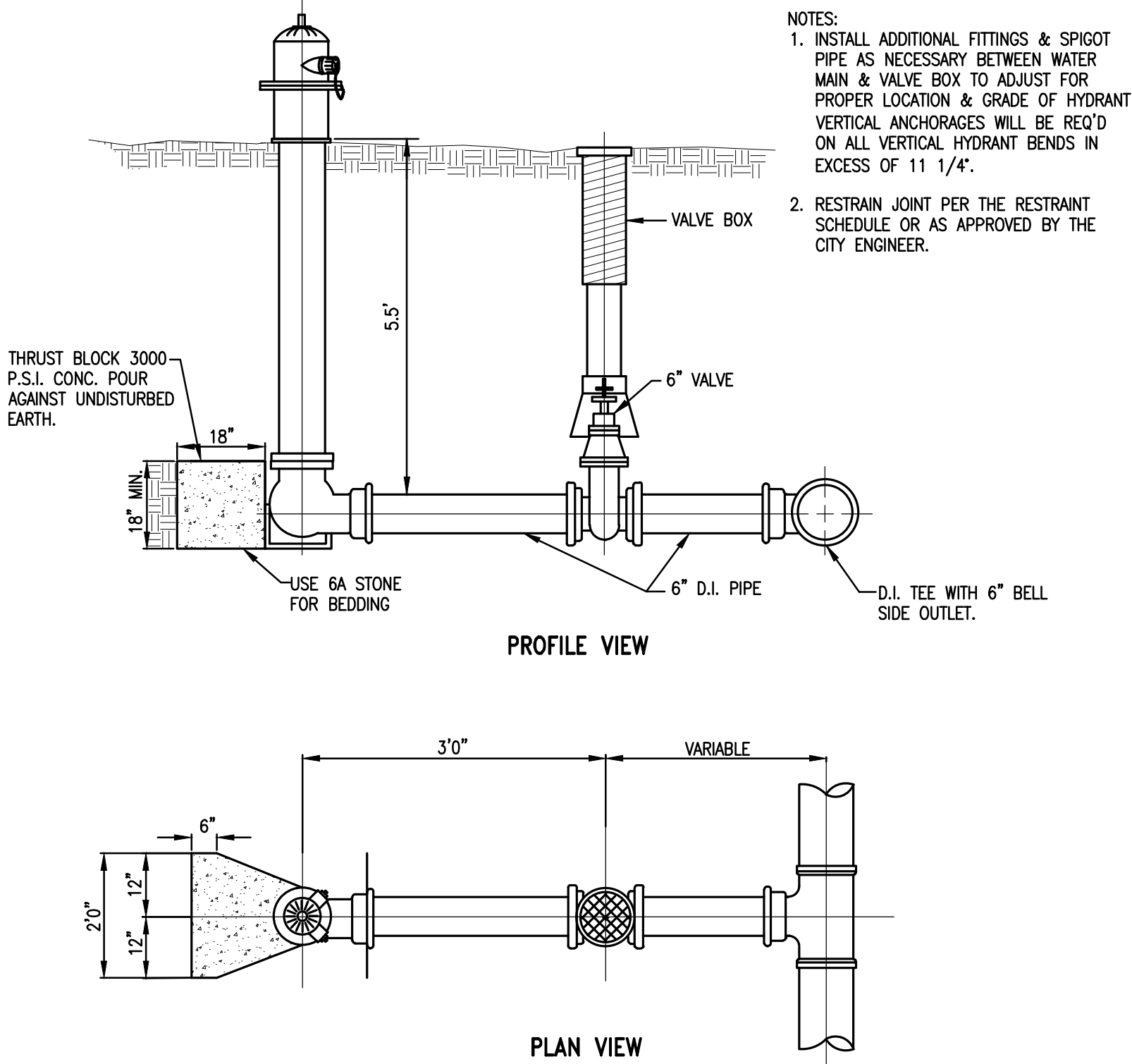


THRUST BLOCK AT 11 1/4° BEND

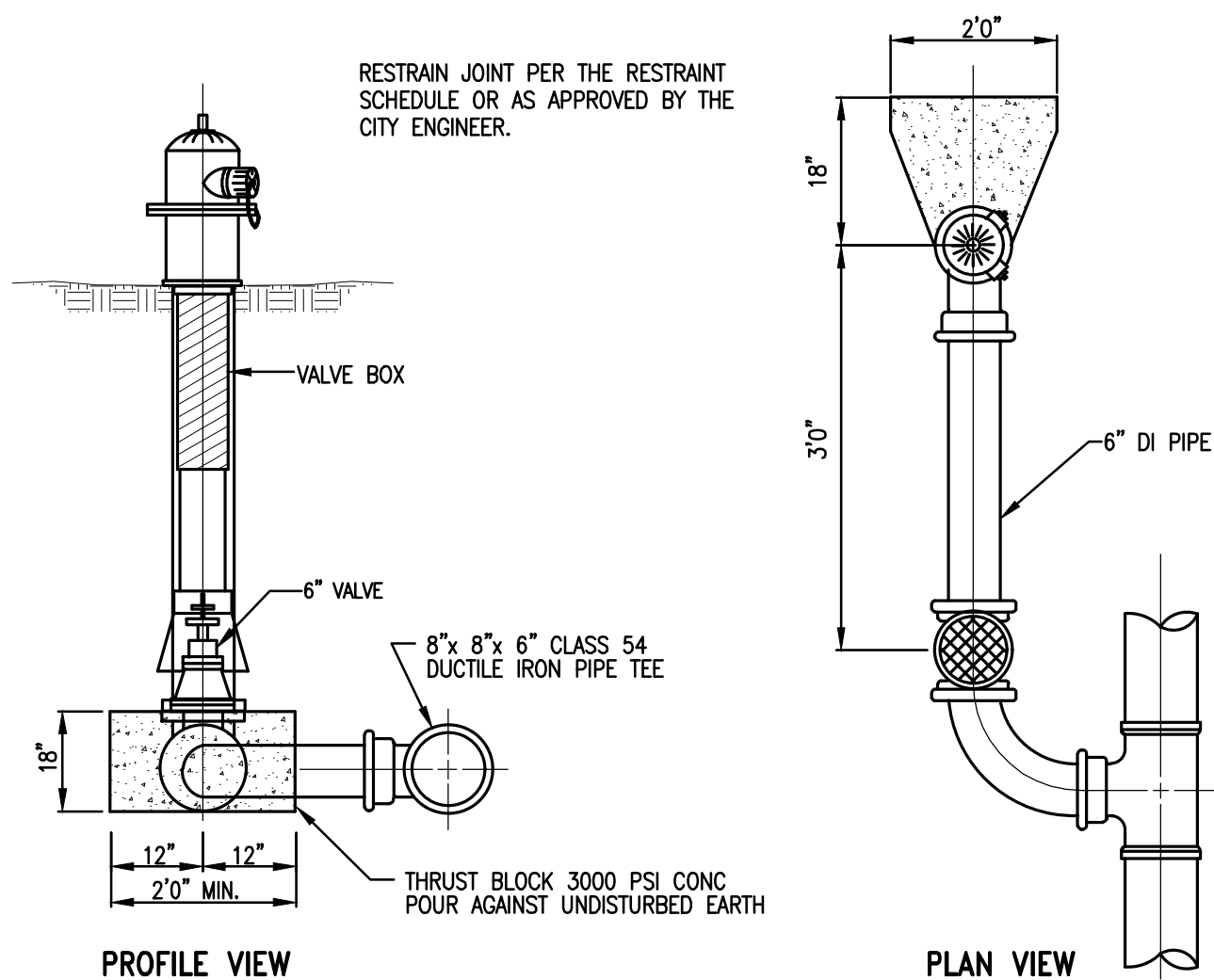
DIA. OF TEE		THRUST BLOCK		
D	D <sub>1</sub>	A	B	C
8"	8"	2'0"	21"	
12"	8"	2'0"	21"	
16"	8"	2'0"	21"	
12"	12"	3'0"	2'0"	
16"	12"	3'0"	2'0"	
20"	12"	3'0"	2'0"	
24"	12"	3'0"	2'0"	
16"	16"	4'0"	2'3"	



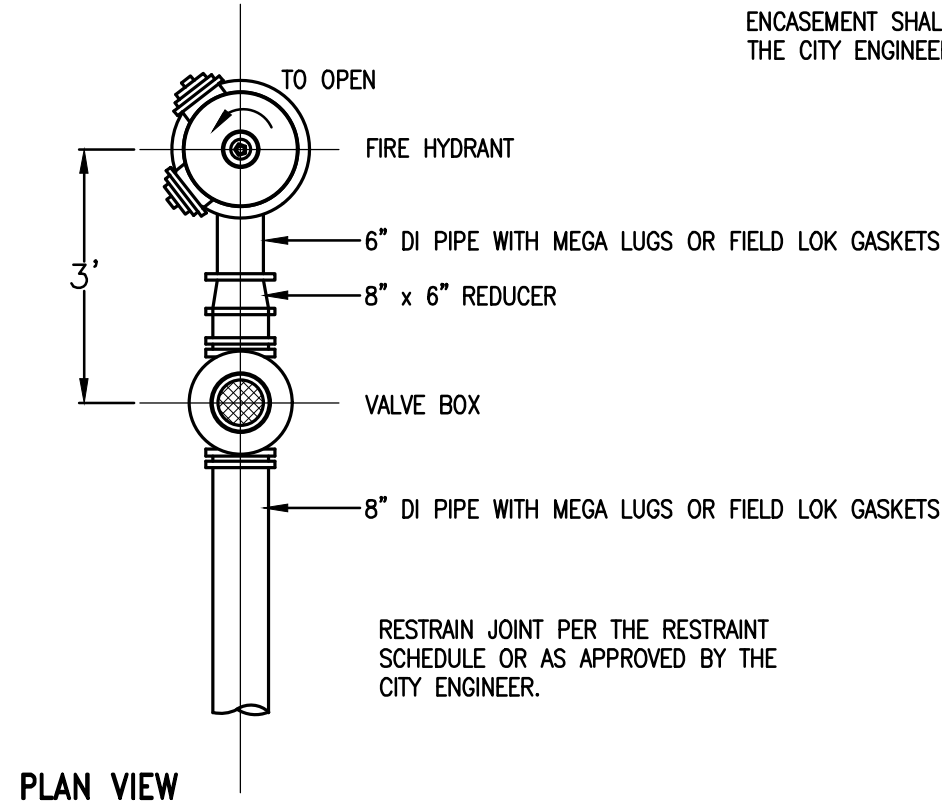
THRUST BLOCK AT TEE



STANDARD HYDRANT SETTING



CLOSE COUPLE HYDRANT SETTING

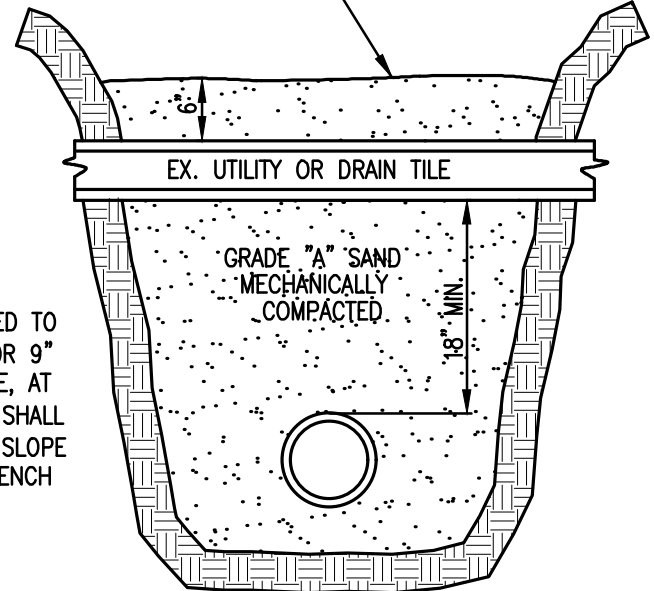


TEMPORARY HYDRANT

## WATER MAIN NOTES

- ALL SURFACE STRUCTURES, SUCH AS HYDRANTS, GATE VALVES AND VALVE BOXES SHALL BE SET TO GRADE AS APPROVED BY THE CITY ENGINEER.
- WATER MAIN SHALL BE PLACED LEVEL THROUGH ALL GATE WELLS.
- PROVIDE 5'-FOOT, 6-INCH COVER BELOW EXISTING ROADWAY CENTERLINE OR GROUND AT WATER MAIN LOCATION, WHICHEVER IS LOWEST.
- WHEN JACKING OR BORING, ALL VOIDS SHALL BE FILLED BY MEANS OF PRESSURE GROUTING WITH 1:3 CEMENT-SAND MORTAR. THIS WORK MUST BE ACCOMPLISHED WITHIN 24 HOURS OF TESTING AFTER THE WATER MAIN CROSSING HAS BEEN COMPLETED. WATER MAIN JACKING OR BORING SHALL EXTEND A MINIMUM OF 10 FEET OUTSIDE THE EDGES OF THE PAVEMENT.
- FIRE HYDRANTS SHALL BE EAST JORDAN IRON WORKS MODEL 5 BR, A-423 CONFORMING TO A.W.W.A. C-502 IMPROVED HYDRANT SPECIFICATION. ALL FIRE HYDRANTS SHALL BE EQUIPPED WITH A 4-INCH STORZ CONNECTION.
- GATE VALVES FOR SIZES 6-INCH THROUGH 16-INCH WATER MAIN SHALL BE IRON BODY, FULLY BRONZE MOUNTED, RESILIENT WEDGE WITH NON-RISING STEMS OPENING COUNTERCLOCKWISE WITH A 2-INCH SQUARE OPERATING NUT. VALVES SHALL CONFORM TO A.W.W.A. C-500 SPECIFICATION. VALVES SHALL BE DESIGNED FOR A WORKING PRESSURE OF 200 P.S.I. AND A TEST PRESSURE OF 400 P.S.I. VALVES SHALL BE ORDERED WITH INLET AND OUTLET CONNECTIONS COMPATIBLE TO THE WATER PIPE JOINT USED ON THE SYSTEM.
- WATER SERVICE AND WATER MAIN PIPE SHALL BE:
  - 1-INCH THROUGH 2-INCH DIAMETER SERVICE LINE SHALL BE DOMESTIC "K" COPPER.
  - 4-INCH THROUGH 16-INCH DIAMETER WATER MAIN SHALL BE DUCTILE IRON A.N.S.I. A 21-55-65 CLASS 54.
- ALL WATER SYSTEM CONSTRUCTION SHALL CONFORM TO THE CURRENT STANDARDS AND GENERAL SPECIFICATION OF THE CITY OF DEXTER AND ANY OTHER AGENCY HAVING JURISDICTION OVER THE CONSTRUCTION AREA.
- CONNECTION TO EXISTING WATER MAIN SHALL BE MADE ONLY AFTER HYDROSTATIC AND BACTERIOLOGICAL TESTS HAVE BEEN SUCCESSFULLY COMPLETED AND APPROVED BY THE CITY ENGINEER OR THE CITY OF DEXTER UTILITIES DEPARTMENT.
- COMPACTED SAND BACKFILL CONSISTING OF M.D.O.T. CLASS II GRANULAR MATERIAL COMPACTED TO 95% OF MAXIMUM UNIT WEIGHT MUST BE PLACED IN ALL TRENCHES UNDER THE 1:1 INFLUENCE OF THE ROADWAY, SIDEWALK, BIKEPATH, ETC.
- THRUST BLOCK IS ONLY ALLOWED WITH PRIOR APPROVAL OF CITY ENGINEER. OTHERWISE, USE THE JOINT RESTRAINT SCHEDULE WITH BENDS.
- FLUSHING SHALL INCLUDE THE USE OF A "POLLY PIG" OR APPROVED EQUAL EQUIPMENT, TO REMOVE ACCUMULATED DEPOSITS AS DIRECTED BY THE CITY ENGINEER.
- POLYETHYLENE ENCASUREMENT SHALL BE INSTALLED ON ALL DUCTILE IRON WATER MAIN AND FITTINGS. POLYETHYLENE ENCASUREMENT SHALL MEET THE REQUIREMENTS SPROFIED IN AWWA C105 (ANSI 21.5), LATEST REVISION, AS DIRECTED BY THE CITY ENGINEER.

NOTE: WHERE CONCRETE ENCASEMENT IS SPECIFIED FOR NEW UTILITY A 6" MINIMUM LAYER OF MECHANICALLY COMPACTED SAND SHALL BE MAINTAINED BETWEEN EX. UTILITY & TOP OF CONCRETE ENCASEMENT

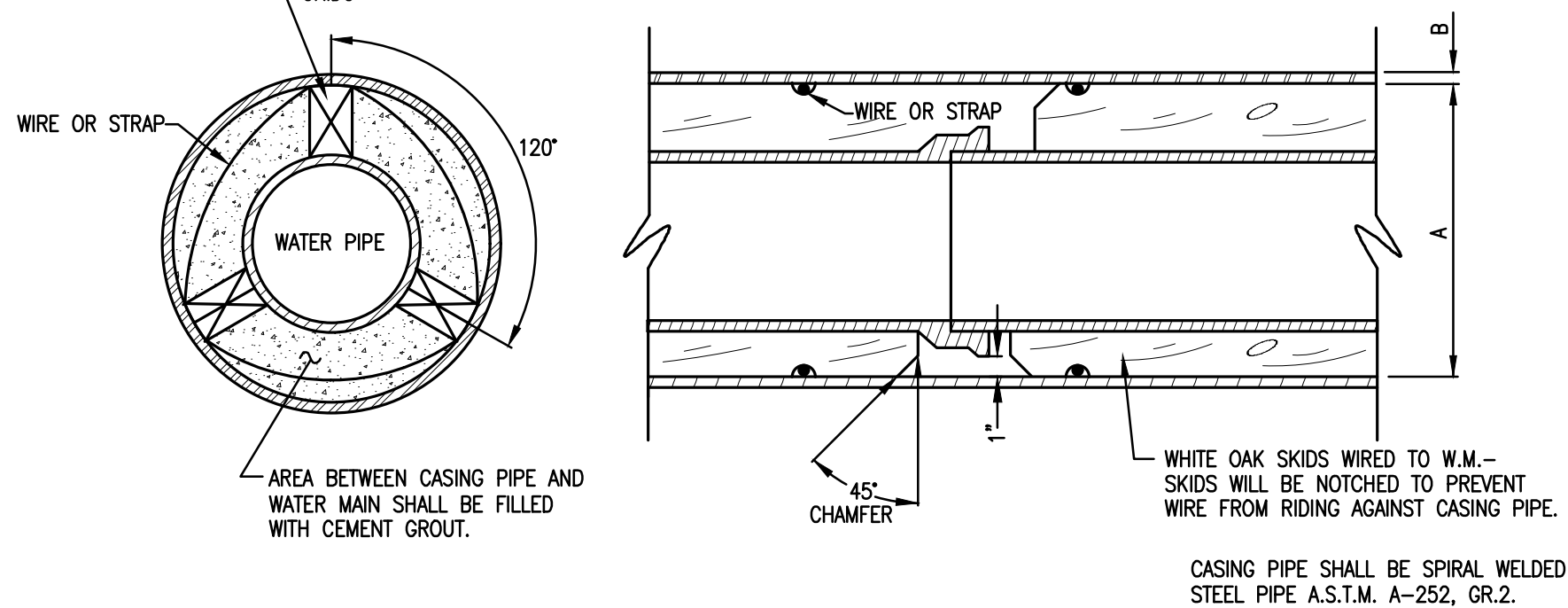


STANDARD PIPE SUPPORT

COMPACTED SAND COMPACTED TO 95% MDD SHALL EXTEND FOR 9" EACH SIDE OF EXISTING PIPE, AT 6" ABOVE EXISTING PIPE & SHALL SLOPE OUT AT A 1:1 (45°) SLOPE TO THE BOTTOM OF THE TRENCH

DIA. OF WATER MAIN	MIN. (L.D.) "A"	ROAD CROSSING	RAILROAD CROSSING
		MIN. "B"	MIN. "B"
6"	14"	.250"	.312"
8"	16"	.250"	.375"
12"	20"	.250"	.438"
16"	24"	.375"	.500"

- NOTES:
- MAINTAIN MIN OF 5'6" OF COVER BETWEEN GROUND ELEVATION & TOP OF CASING
  - THE ENDS OF THE CASING SHALL BE BULKHEADED AND ANNULAR SPACE FILLED WITH CEMENT GROUT



STANDARD CASING SECTION

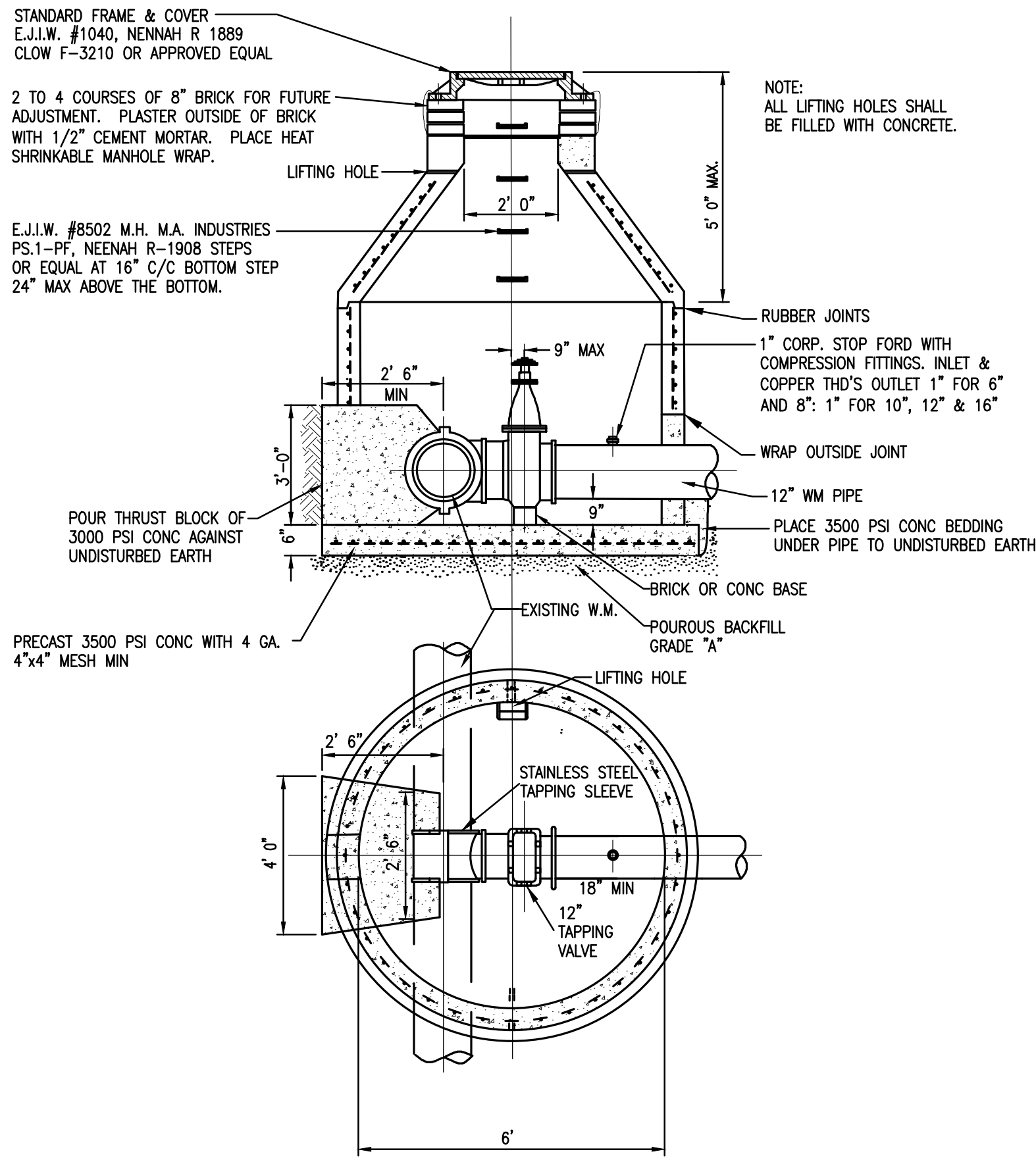
REVISIONS:  
ADOPTED JUNE 2018  
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DATE: JUNE 2018  
PROJ NUMBER: PD  
PROJ INGR: ###  
ENG: ###  
CADD: PR  
COUNTY: WASHTENAW  
CITY/TOWNSHIP: CITY OF DEXTER  
SCALE: NTS  
VERT DATUM: N/A  
HORIZ DATUM: N/A

CITY OF DEXTER  
WATER MAIN

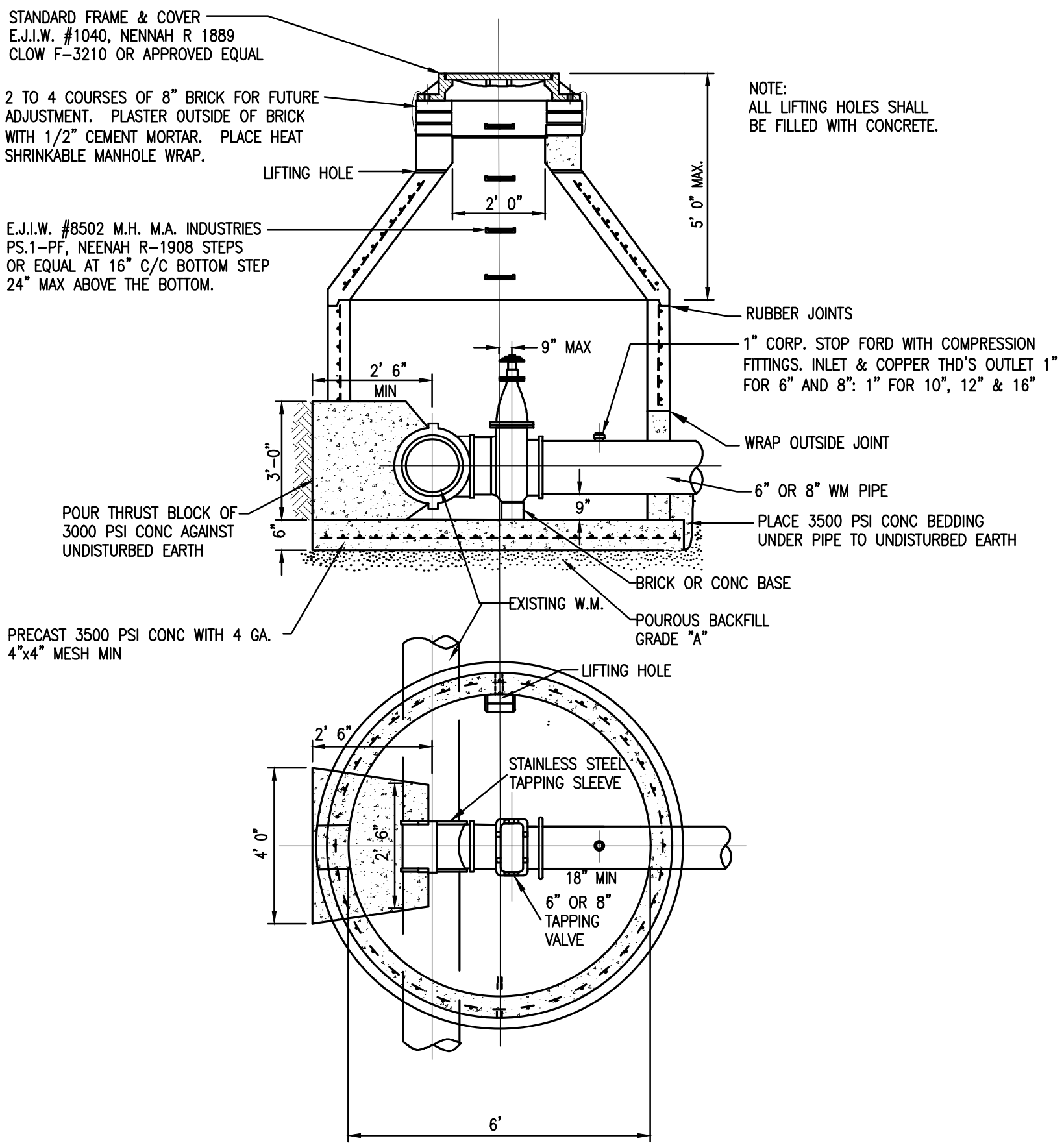
STANDARD DETAILS

DRAWING PATH: S:\CITY\ Dexter\ Village Standards\ CADD\ 2018\ Dexter\_WMP2.dwg      Feb 07, 2019 - 3:14pm



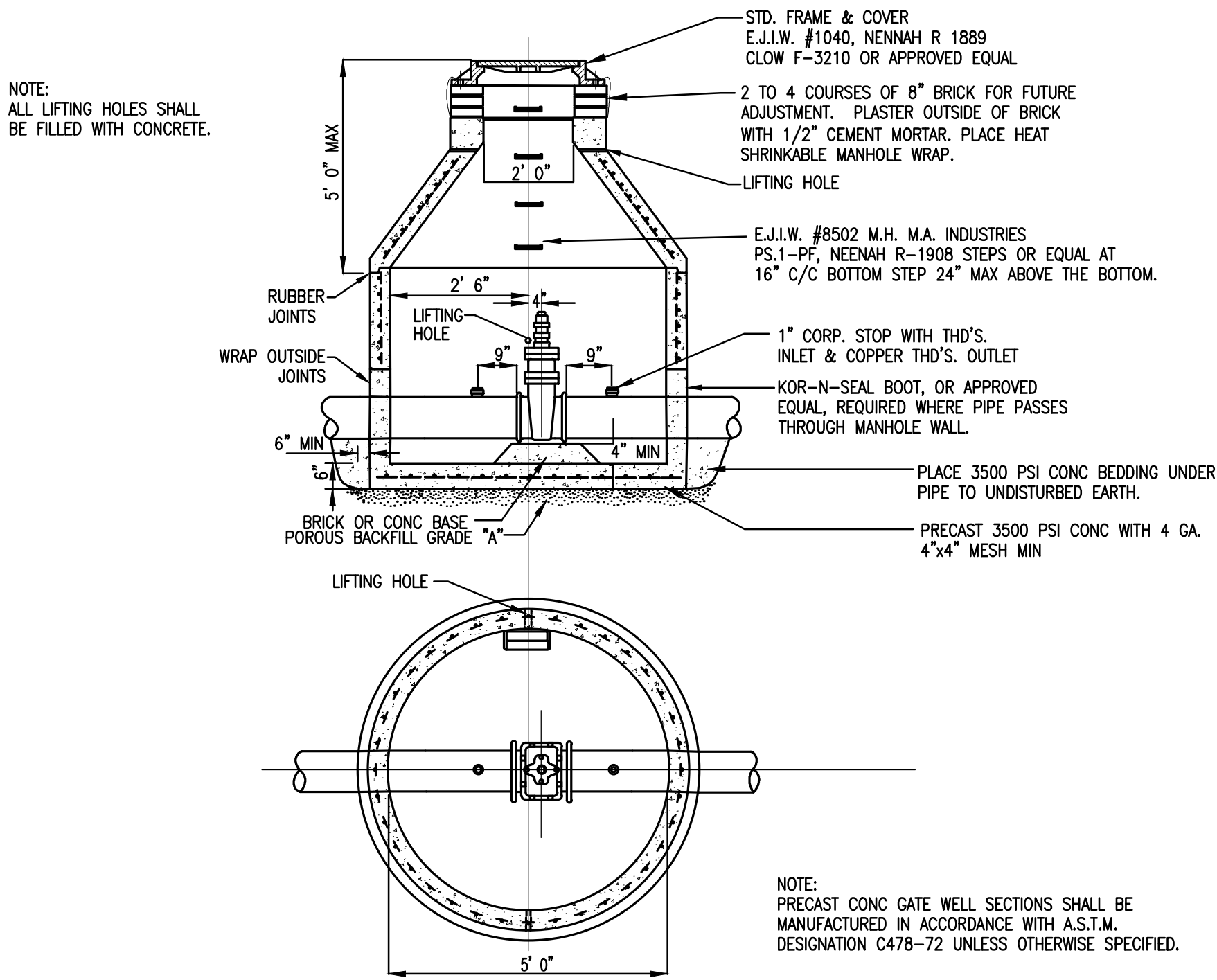
STANDARD 12"  
TAPPING SLEEVE, VALVE & WELL

NOTE:  
LOCATE TAPPING SLEEVE, VALVE & WELL SUCH THAT  
THE EXISTING JOINT IS OUTSIDE THE STRUCTURE.



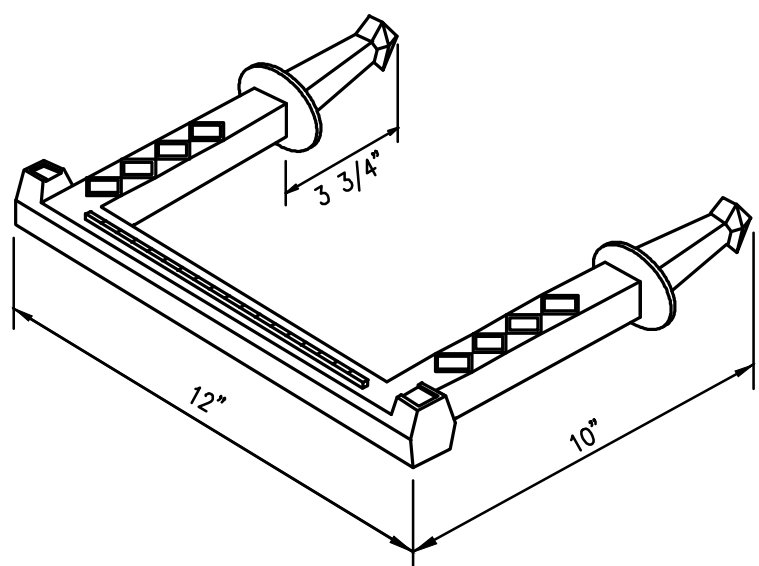
STANDARD 6" & 8"  
TAPPING SLEEVE, VALVE & WELL

NOTE:  
LOCATE TAPPING SLEEVE, VALVE & WELL SUCH THAT  
THE EXISTING JOINT IS OUTSIDE THE STRUCTURE.

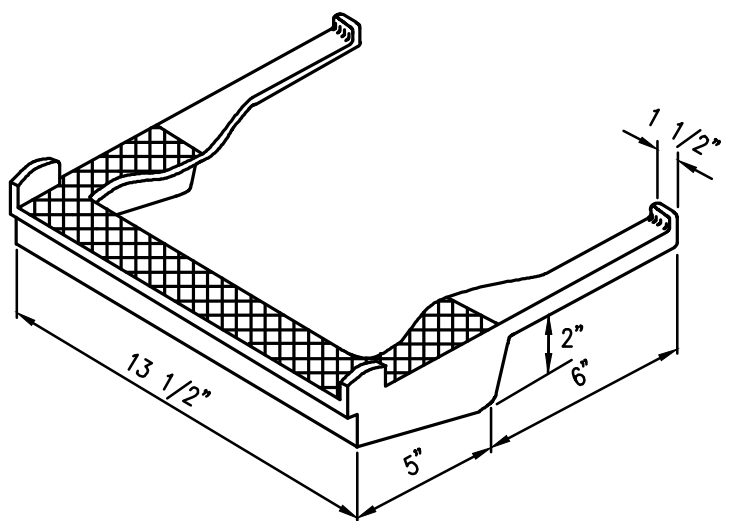


STANDARD PRECAST GATE WELL

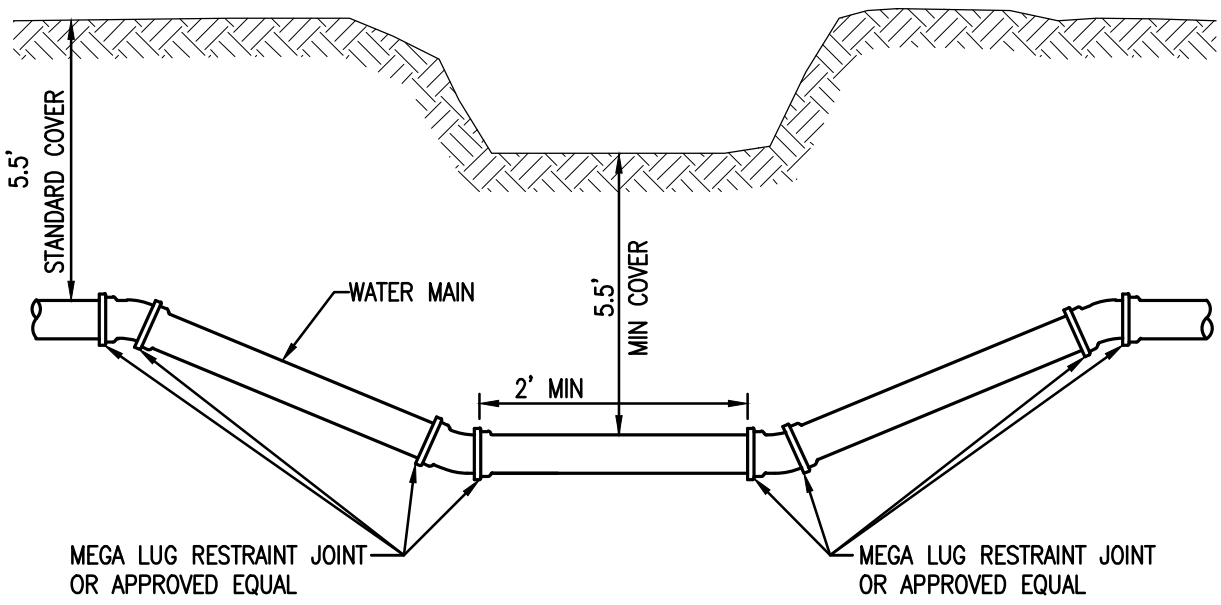
NOTE: FOR 6" OR 8" WATER MAIN, USE 5'-0" DIAMETER GATE WELL.  
FOR 12" OR 16" WATER MAIN, USE 6'-0" DIAMETER GATE WELL.



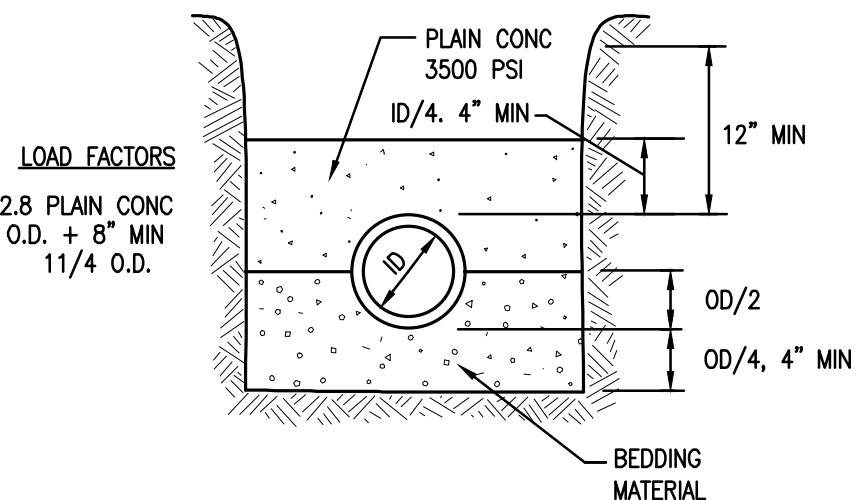
MANHOLE STEP  
M.A. PSI-375



STANDARD MANHOLE STEP  
E.J.I.W. 8502



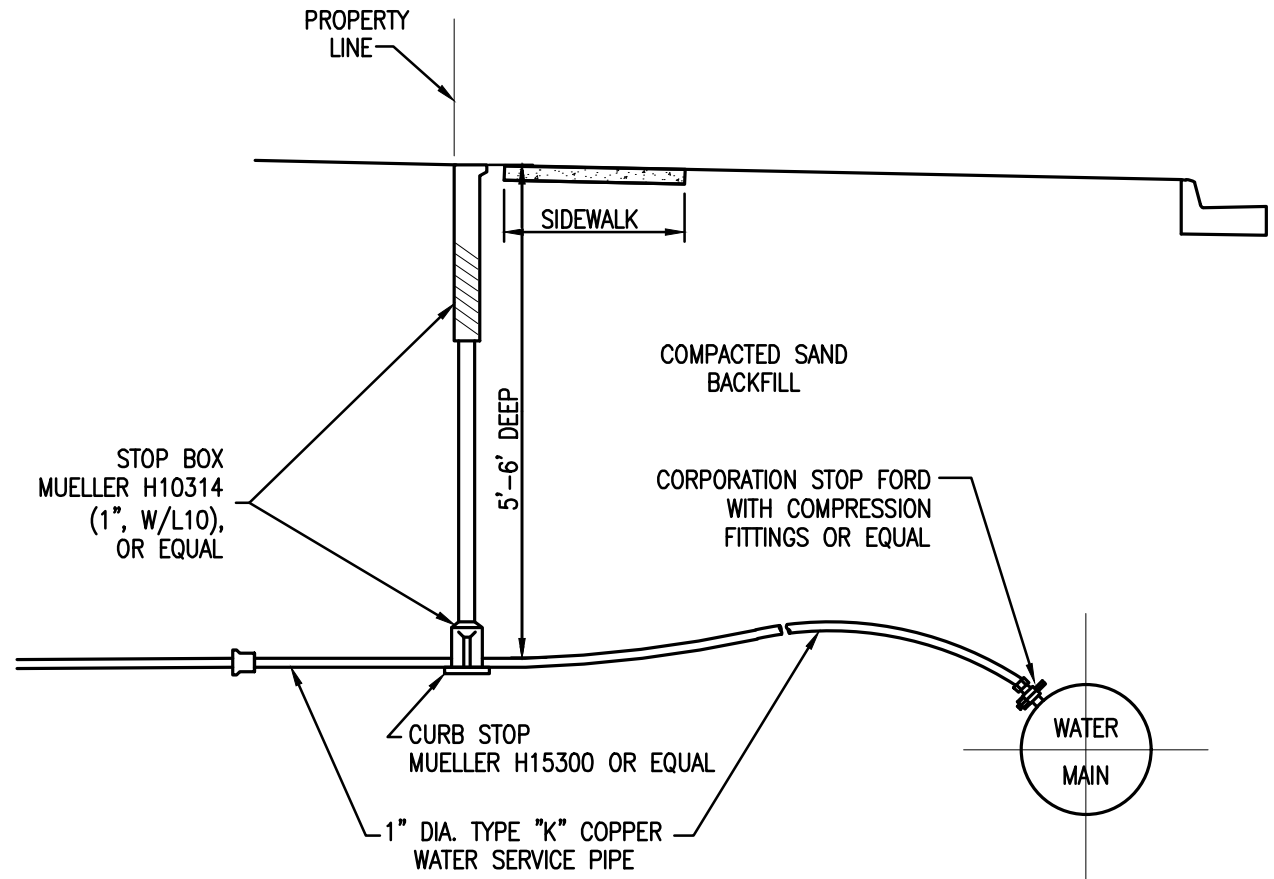
DITCH OR STREAM CROSSING



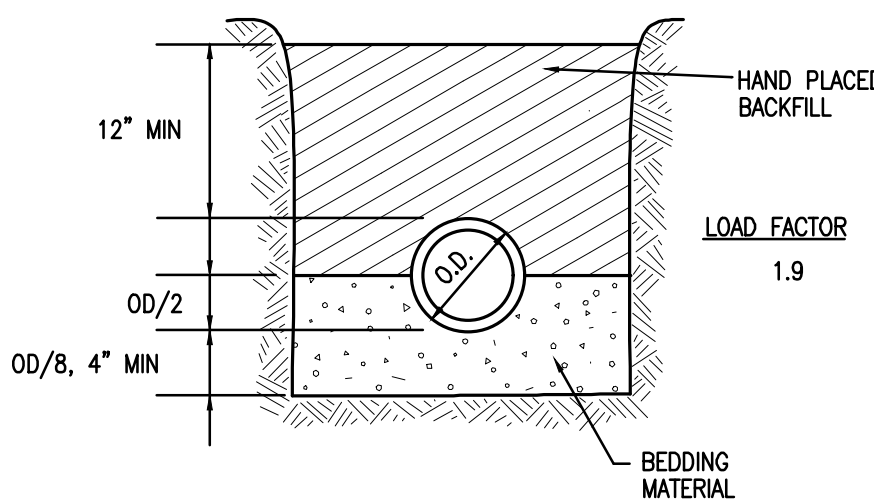
CLASS A

MAX WIDTH OF TRENCH 12" ABOVE TOP OF PIPE
6" THRU 12" PIPE - 30" WIDE
15" THRU 21" PIPE - OD+16"
MIN WIDTH OF TRENCH 12" ABOVE THE TOP OF THE PIPE SHALL BE 6" ON EACH SIDE OF PIPE.

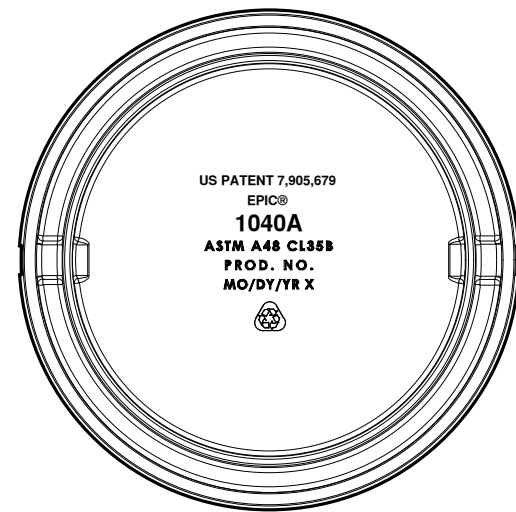
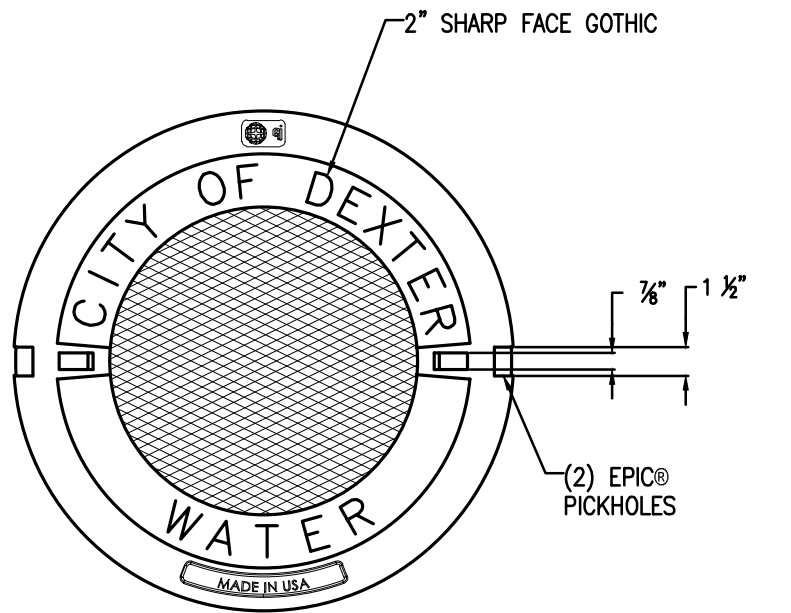
PIPE BEDDING DETAILS



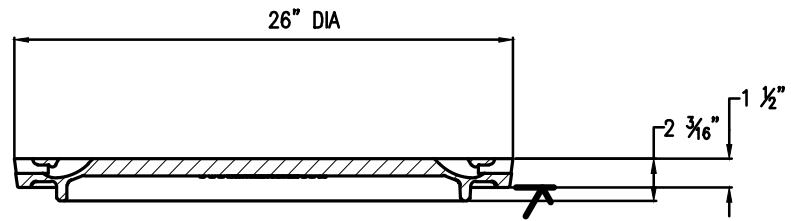
TYPICAL WATER SERVICE  
DETAIL



CLASS B



BOTTOM VIEW



SECTION



EPIC® DETAIL

STANDARD FRAME & COVER  
E.J.I.W. #1040 TYPE A

REVISIONS:  
ADOPTED JUNE 2018  
###  
###  
###  
###  
###  
###

DATE: JUNE 2018  
PROJECT: CITY OF DEXTER  
SHEET: 2  
OF 2

CITY OF DEXTER  
WATER MAIN  
STANDARD DETAILS

## Water Main Notes

1. All water system construction shall conform to the current standards and general specification of the City of Dexter and any other agency having jurisdiction over the construction area.
2. All surface structures, such as hydrants, gate valves and valve boxes shall be set to grade as approved by the City Engineer.
3. Water main shall be placed level through all gate wells.
4. Provide a minimum of 5.5 feet of cover below existing roadway centerline elevation or existing elevation at water main location, whichever is lowest.
5. When jacking and boring, all voids shall be filled by means of pressure grouting with 1:3 cement-sand mortar. This work must be accomplished within 24 hours of the water main being successfully tested. Water main jacking or boring shall extend a minimum of 10 feet beyond the edges of the pavement.
6. Fire hydrants shall be East Jordan Iron Works Model 5 BR, A-423 conforming to A.W.W.A. C-502 improved hydrant specification. All fire hydrants shall be equipped with a 4-inch Storz connection.
7. Gate valves for sizes 6-inch through 16-inch water main shall be iron body, fully bronze mounted, resilient wedge with non-rising stems opening counterclockwise with a 2-inch square operating nut. Valves shall conform to A.W.W.A. C-500 specification. Valves shall be designed for a working pressure of 200 P.S.I. and a test pressure of 400 P.S.I. Valves shall be ordered with inlet and outlet connections compatible to the water pipe joint used on the system.
8. Water service and water main pipe shall be:
  - a. 1-inch through 2-inch diameter service lines shall be domestic “k” copper.
  - b. 4-inch through 16-inch diameter water main shall be ductile iron A.N.S.I. A 21-55-65 Class 54.
9. Connection to existing water main shall be made only after hydrostatic and bacteriological tests have been successfully completed and approved by the City Engineer or the City of Dexter Utilities Department.
10. Compacted sand backfill consisting of M.D.O.T. Class II granular material compacted to 95% of maximum unit weight must be placed in all trenches within the 1:1 influence of the roadway, sidewalk, bike path, etc.

11. A thrust block is only allowed with prior approval of City Engineer. Otherwise, use the joint restraint schedule with bends.
12. Flushing shall include the use of a “Polly Pig” or approved equal equipment, to remove accumulated deposits as directed by the City Engineer.
13. When called for on the plans, polyethylene encasement shall be installed on all ductile iron water main and fittings. Polyethylene encasement shall meet the requirements specified in A.W.W.A. C105 (ANSI 21.5) latest revision, as directed by the City Engineer.
14. All public water main shall contain tracer wire.



## Sanitary Sewer Notes

1. All sewer system construction shall conform to the current standards and general specifications of the City of Dexter and the agency or agencies having jurisdiction over the construction area.
2. All manhole rims shall be set to grade as approved by the City Engineer.
3. Risers on sanitary sewers shall be installed in locations where sewer is over 10 feet deep. Risers shall be installed to a depth of 10 feet below the finished ground elevation.
4. One sanitary sewer service lead shall be provided for each lot, at the center of the lot, along the route of the sanitary sewer unless otherwise specified. The sanitary sewer service lead shall extend a minimum of 2 feet beyond the utility easement or right-of-way (proposed or existing).
5. All manholes shall use eccentric cones placed toward the property line unless otherwise noted.
6. Infiltration for any section of sewers shall not exceed 200 gallons per inch diameter per mile of sewer per 24 hours.
7. No footing or roof drain shall be connected to the sanitary sewer.
8. Differential of excavation around existing manholes shall not exceed 6 feet.
9. No connection receiving storm water, surface water or ground water shall be made to sanitary sewers.
10. All sanitary sewers shall be subject to television inspection and air infiltration or exfiltration tests, or a combination of the same, prior to acceptance. All sewers over 24 inches in diameter shall be subjected to infiltration tests. All sewers 24 inches in diameter and smaller, where the ground water level is above the top of the pipe is over 2 feet shall be subjected to infiltration tests. All sewers 24 inches in diameter or smaller, where the ground water level is above the top of the pipe is 2 feet or less, shall be subjected to air tests or exfiltration tests.
11. All sewers shall be televised, with test results approved by the City Engineer or the City of Dexter Utilities Department prior to placing the sewer in service. Copies of the tape must be submitted to the City of Dexter and will not be returned.
12. Mandrel testing shall take place to ensure the flexible pipe has been properly bedded and backfilled. The deflection test must be conducted no less than 30 days after installation of final backfill. The maximum allowed deflection is 5%. A nine-arm (point) mandrel shall be used.
13. All Sanitary sewer stubs shall have a water and airtight bulkhead with a marker designating the location of the stub.

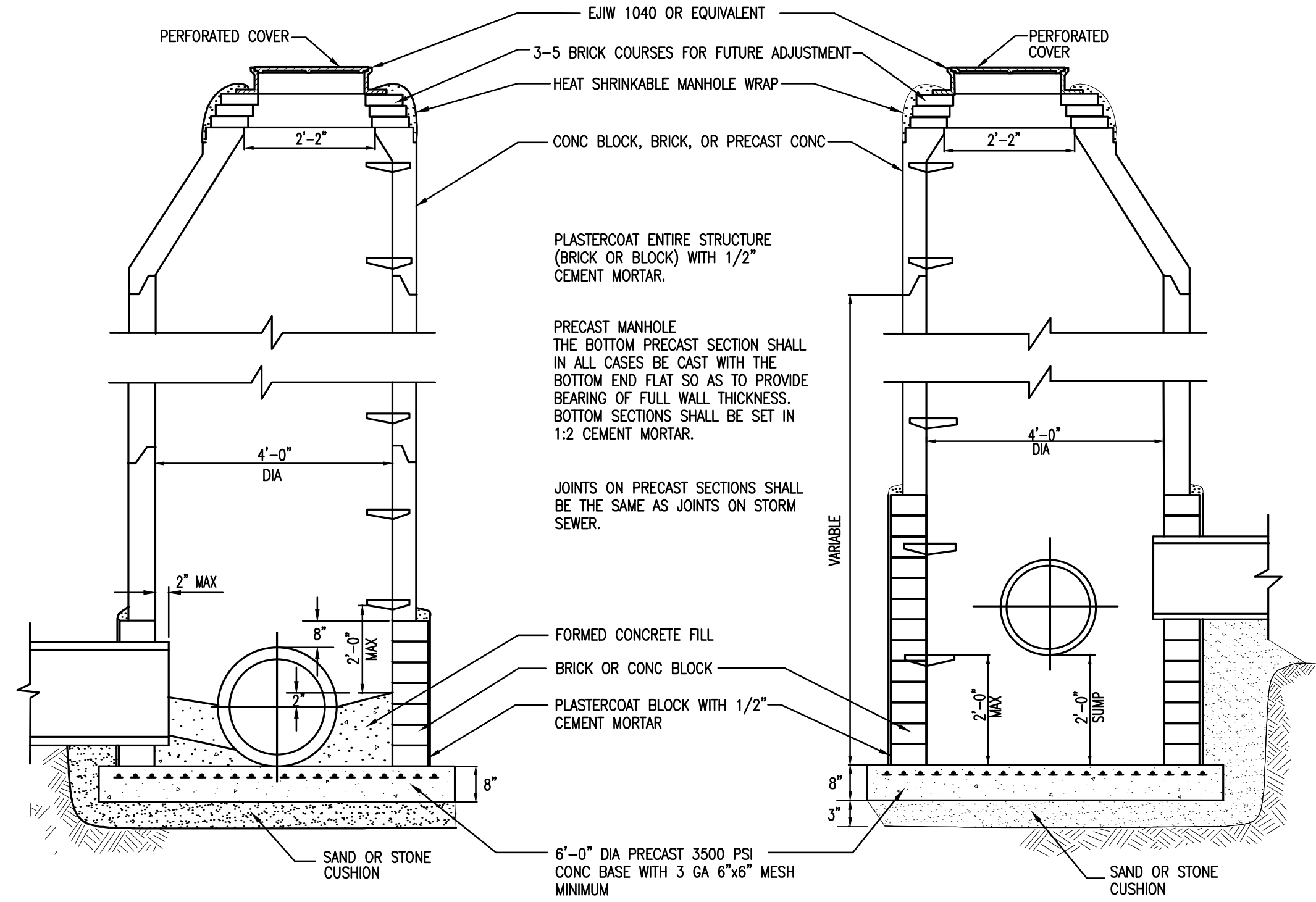
DRAWING PATH: S:\CUT\Dexter\Images\Standards\CADD\2018\Dexter\_Sm2.dwg Feb 07, 2019 - 3:13pm

MH STEP SPACING:  
CONC BLOCK MH ..... 18" CENTERS  
BRICK MH ..... 15" CENTERS  
PRECAST MH ..... 16" CENTERS  
TOP STEP TO BE 21" BELOW TOP OF FRAME

MIN CONE HEIGHTS:  
BRICK CONCENTRIC 3'-0"  
BLOCK CONCENTRIC 3'-0"  
PRECAST ECCENTRIC 2'-8" OR 3'-4"

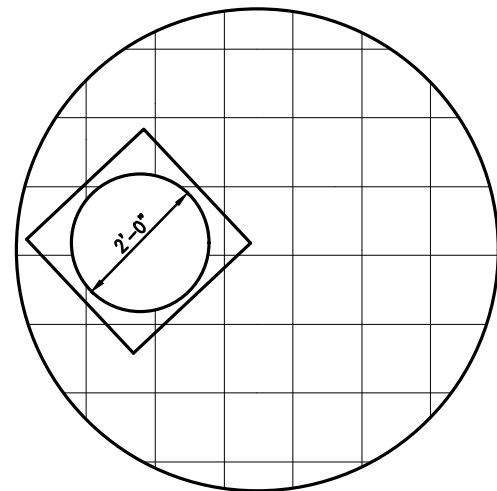
CONC BLOCK MANHOLE:  
APPROVED CONC BLOCK  
USE 6" OR 8" THICK BLOCK TO 16' DEPTH  
USE 12" THICK BLOCK TO 24' DEPTH  
16" BLOCK WALL BELOW 24' DEPTH

PRECAST MANHOLE:  
C-478-72 UP TO 32' DEPTH  
WITH 5" THICK WALL



DETAIL FOR SEWERS  
21" AND LARGER

### STANDARD STORM MANHOLES

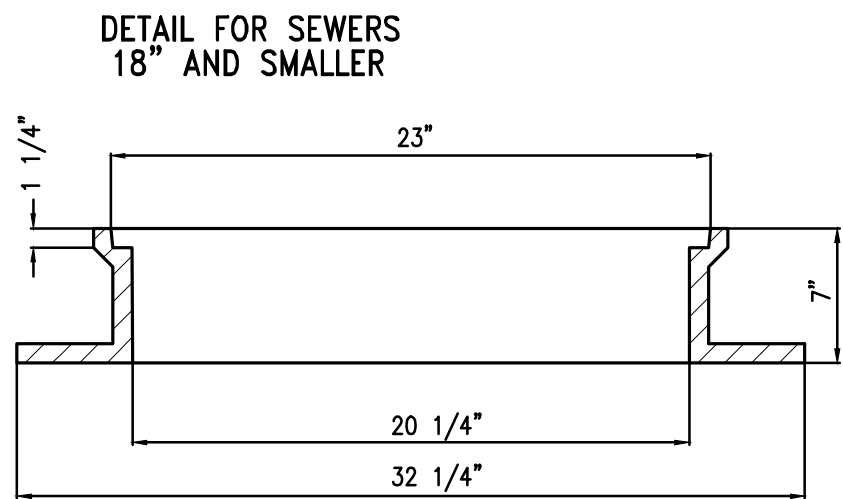


TOP SLAB

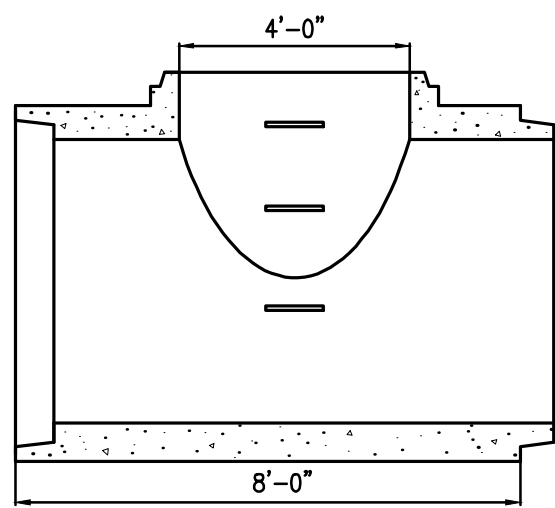
OUTLET D"	MH I.D.	TOP SLAB T"	WALLS W"	REINF. STEEL *
** 24" OR LESS	4'-0"	9"	8"	#6 @ 9" EA. WAY
30"	4'-0"	9"	8"	#6 @ 9" EA. WAY
36"	4'-0"	9"	12"	#6 @ 9" EA. WAY
42"	5'-0"	10"	12"	#6 @ 9" EA. WAY
48" 54"	6'-0"	11"	12"	#7 @ 9" EA. WAY

\* TOP SLAB

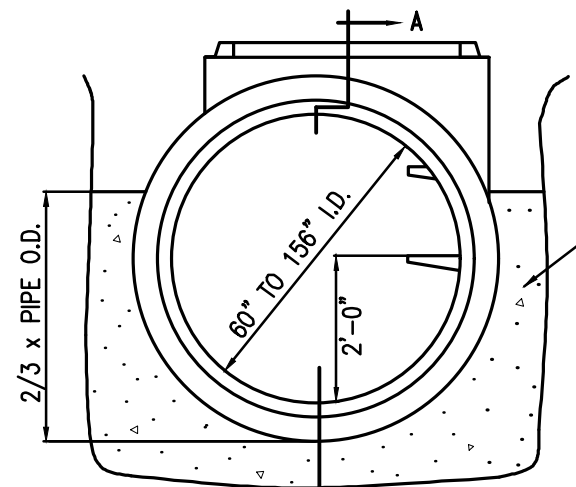
\*\* 2' SUMP REQ. FOR MANHOLE WITH  
OUTLETS OF 18" AND UNDER.



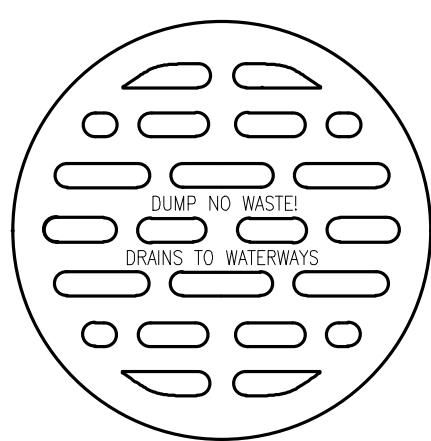
### STANDARD FRAME SERIES 1000 & 3000



SECTION "A"

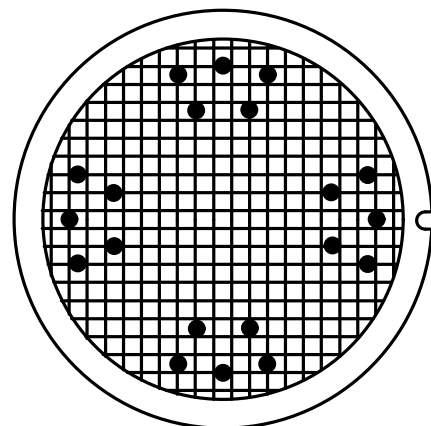


OFFSET MANHOLE TEE



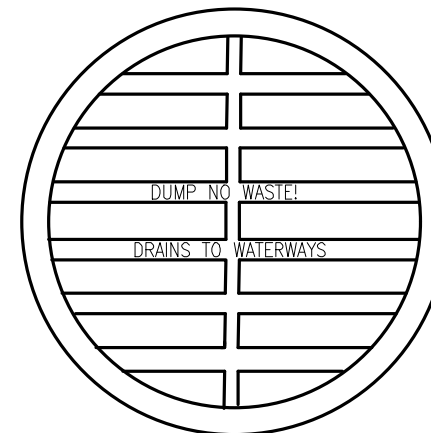
### TYPE M COVER

EJIW 1040



### TYPE B COVER

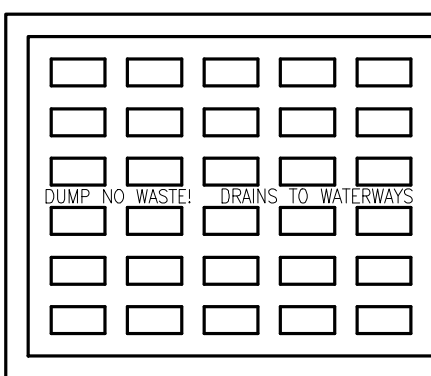
EJIW 1040



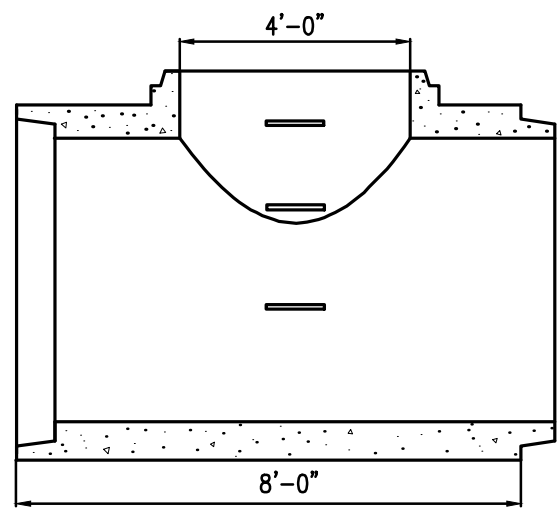
### TYPE N COVER

BEEHIVE

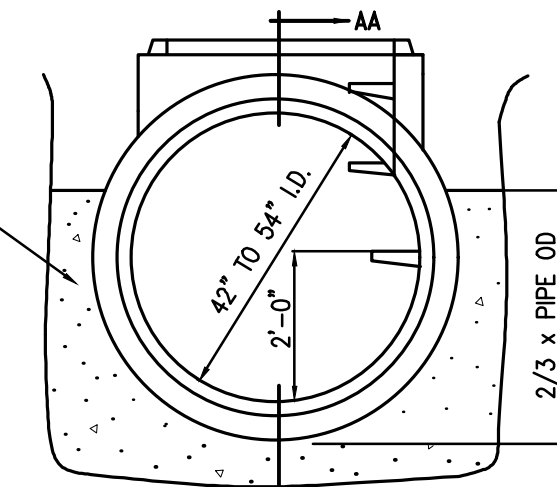
EJIW 1040



### TYPE MI COVER (TOP VIEW)



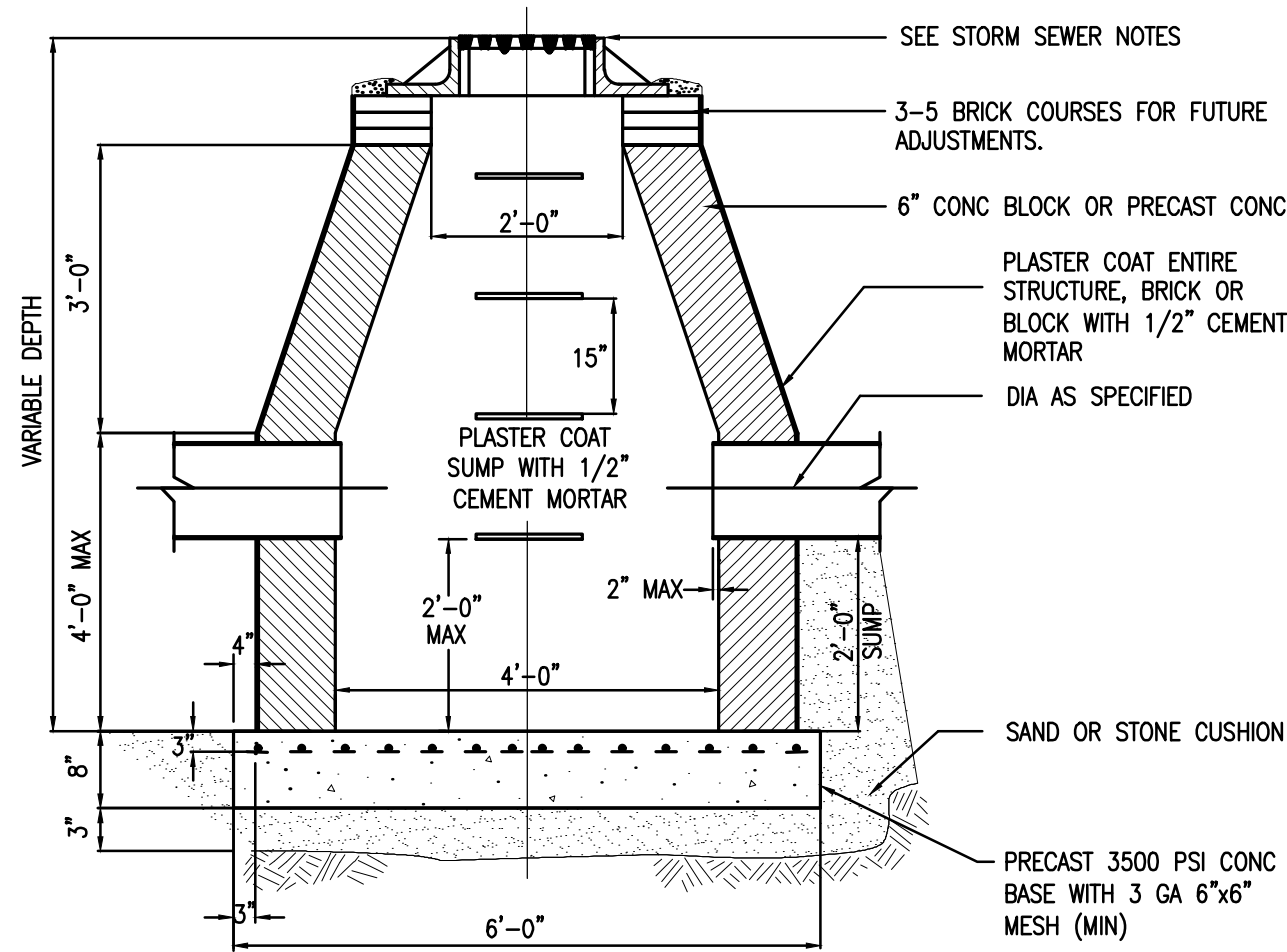
SECTION "AA"



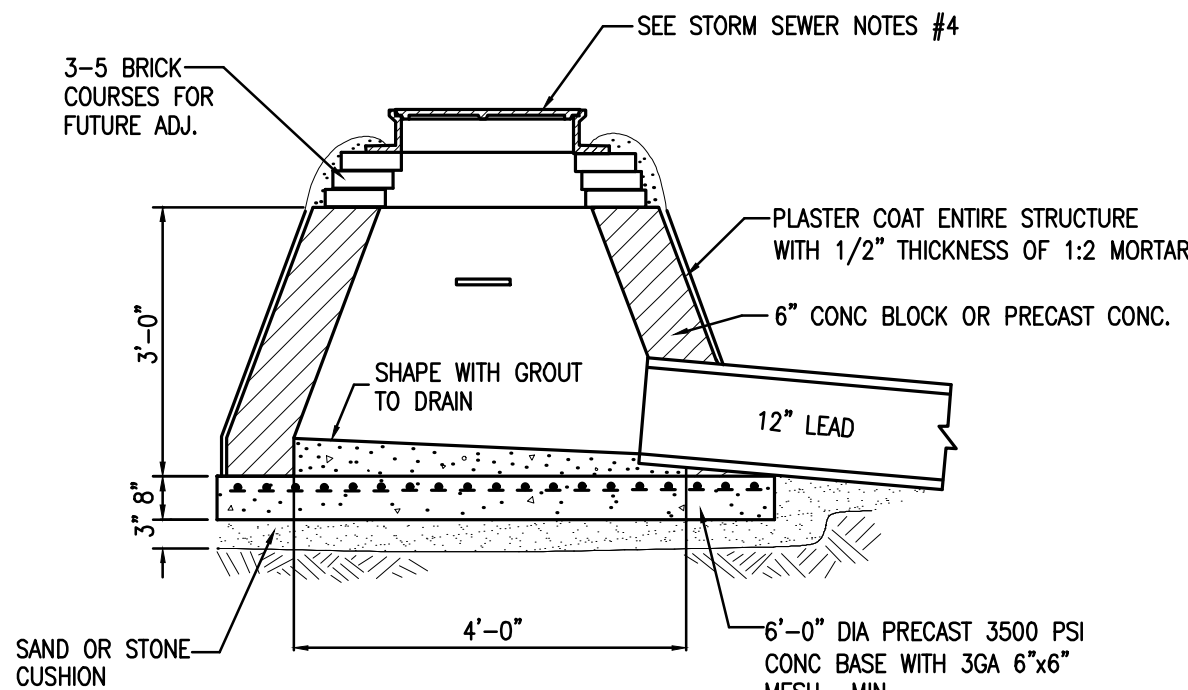
CENTERED MANHOLE TEE

NOTE:  
SHOP DRAWINGS SHALL BE  
PROVIDED FOR ALL  
MANHOLE TEES.

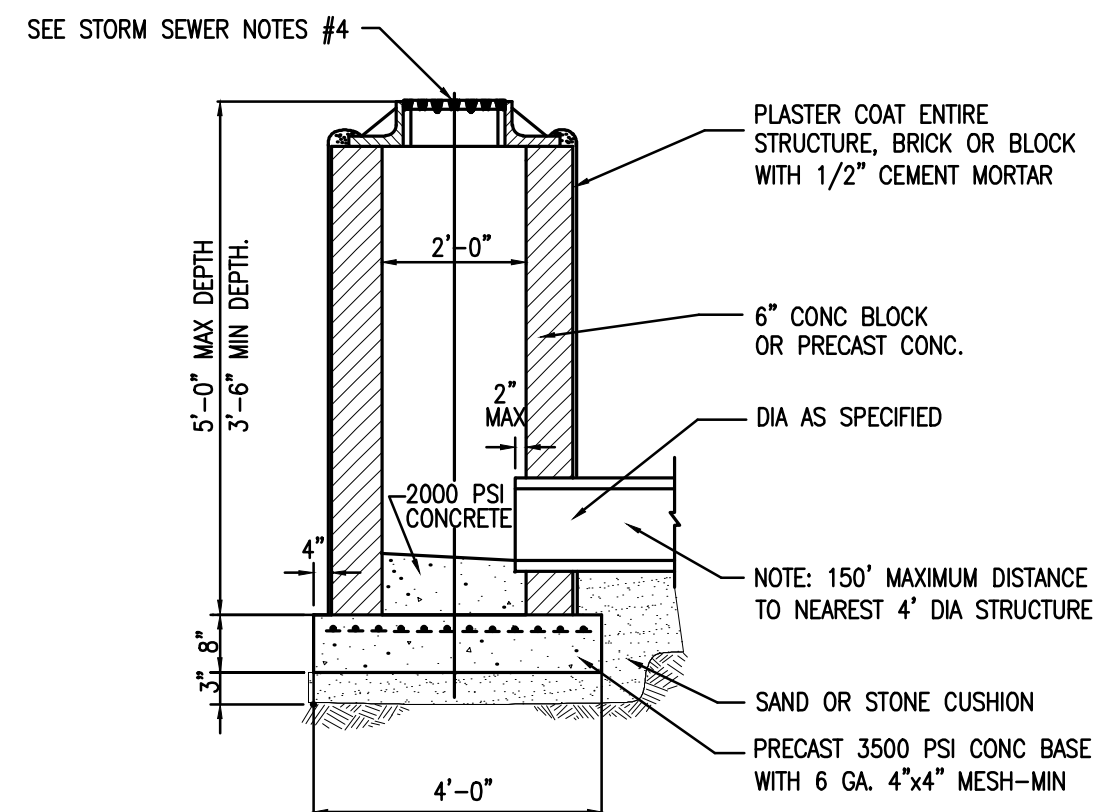
### STANDARD MANHOLE TEES



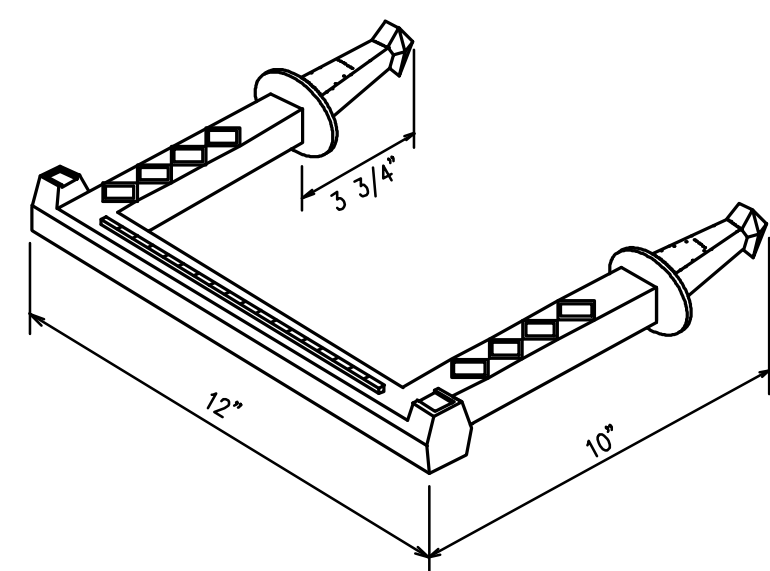
### STANDARD CATCH BASIN



### YARD BASIN



### STANDARD INLET

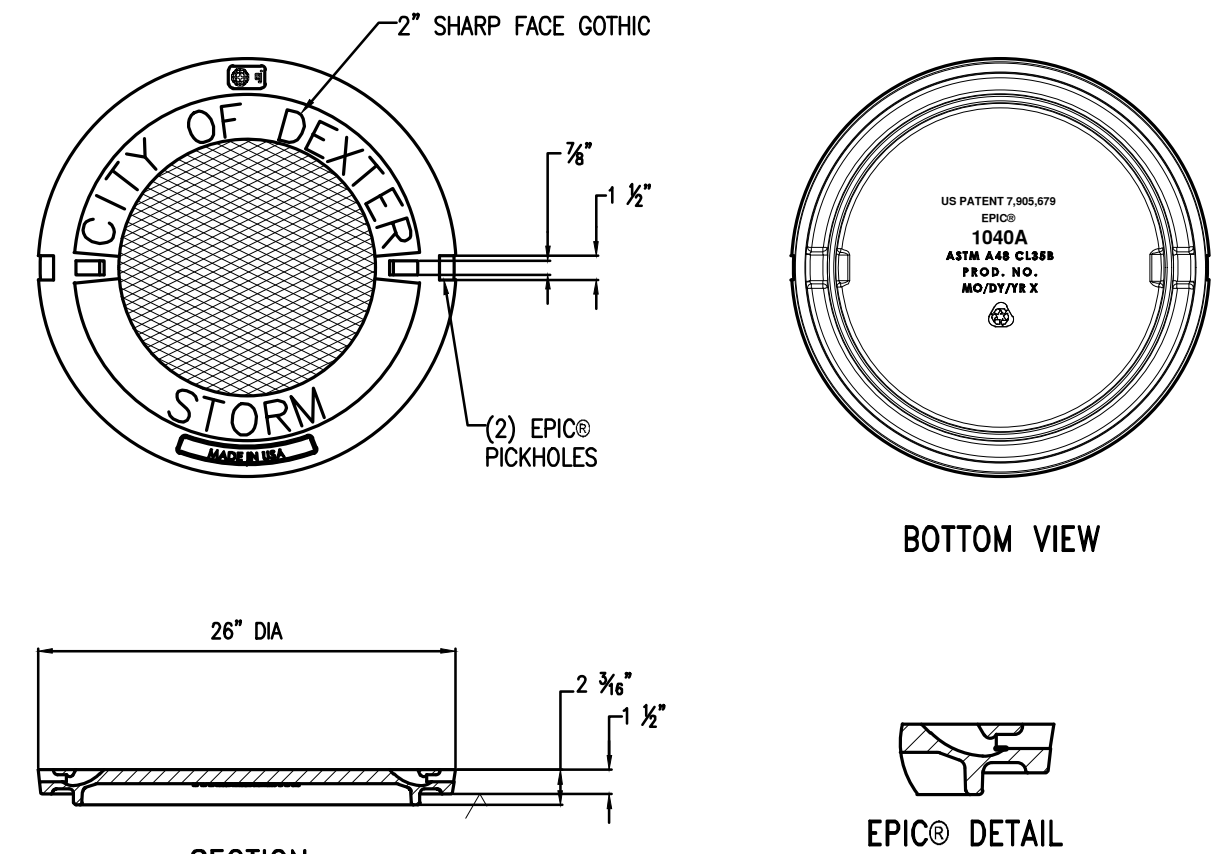


### MANHOLE STEP

M.A. PSI-375

### STORM SEWER NOTES

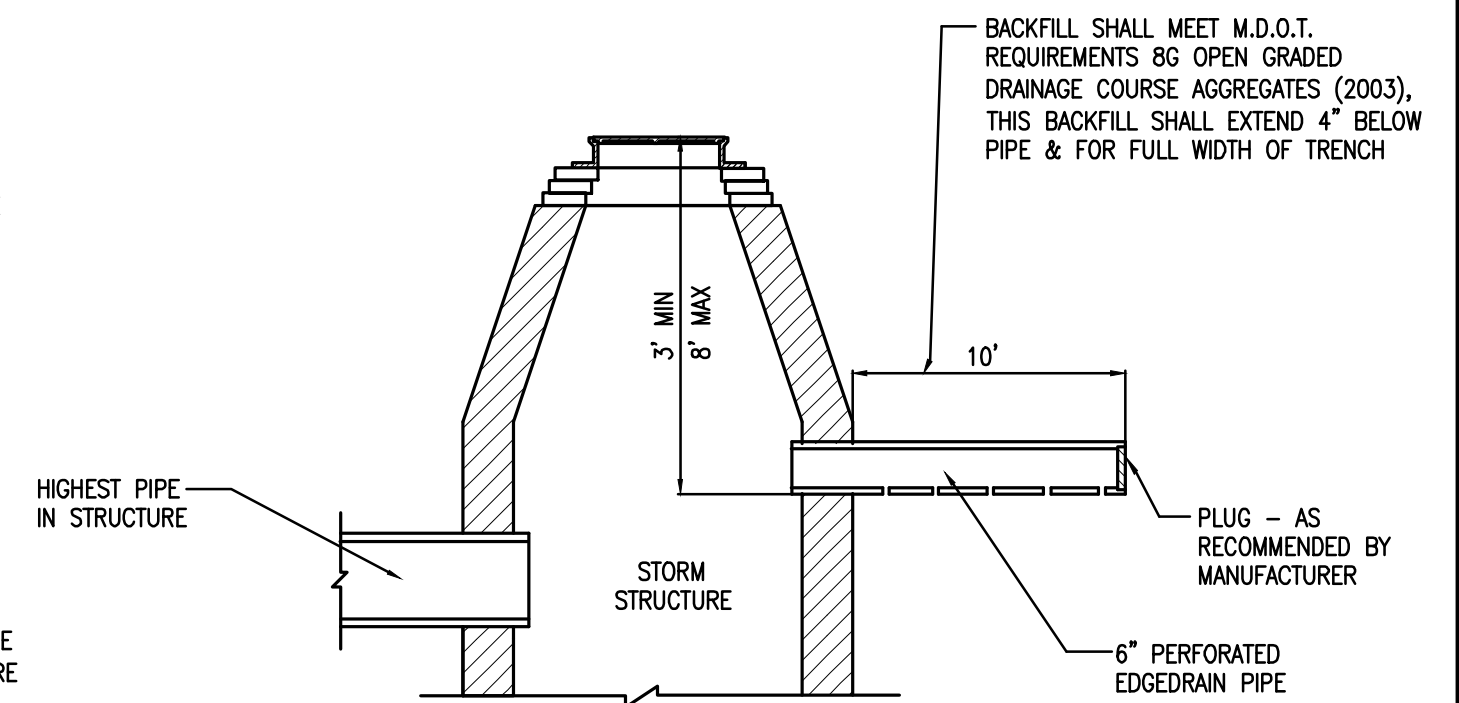
- ALL CASTING RIMS SHALL BE SET TO GRADE AS FURNISHED OR APPROVED BY THE CITY ENGINEER.
- ALL STORM SEWER PIPE SHALL BE C76-IV REINFORCED CONCRETE PIPE UNLESS OTHERWISE APPROVED BY THE CITY.
- ALL CATCH BASIN LEADS SHALL BE A MINIMUM OF 12" DIAMETER C76-IV REINFORCED CONCRETE UNLESS OTHERWISE APPROVED BY THE CITY.
- CATCH BASIN AND INLET FRAME AND COVERS SHALL BE SPECIFIED AS FOLLOWS:
  - WHEN LOCATED IN PAVEMENT EDGE GUTTER LINE, FRAME AND COVER SHALL BE EJIW NO. 5080 OR EQUIVALENT.
  - WHEN LOCATED IN PAVED AREAS OTHER THAN EDGE GUTTER LINE, FRAME SHALL BE EJIW NO. 1040 WITH TYPE "M" COVER OR EQUIVALENT.
  - WHEN LOCATED IN YARD AREAS, FRAMES SHALL BE EJIW NO. 1040 WITH TYPE "N" COVER OR EQUIVALENT.
- MANHOLE STEPS WILL BE REINFORCED POLYPROPYLENE PLASTIC #PS-2-PFS OR APPROVED EQUAL.
- RUBBER JOINTS SHALL BE USED IN LOCATIONS WHERE THE HYDRAULIC GRADIENT IS ABOVE THE PIPE AND WHEN THE STORM SEWER IS LOCATED IN AN EASEMENT AREA.
- ALL DRAINAGE SYSTEM CONSTRUCTION SHALL CONFORM TO THE CURRENT STANDARDS AND GENERAL SPECIFICATIONS OF THE CITY OF DEXTER (ADOPTED JUNE 2018) AND THE AGENCY OR AGENCIES HAVING JURISDICTION OVER THE CONSTRUCTION AREA.



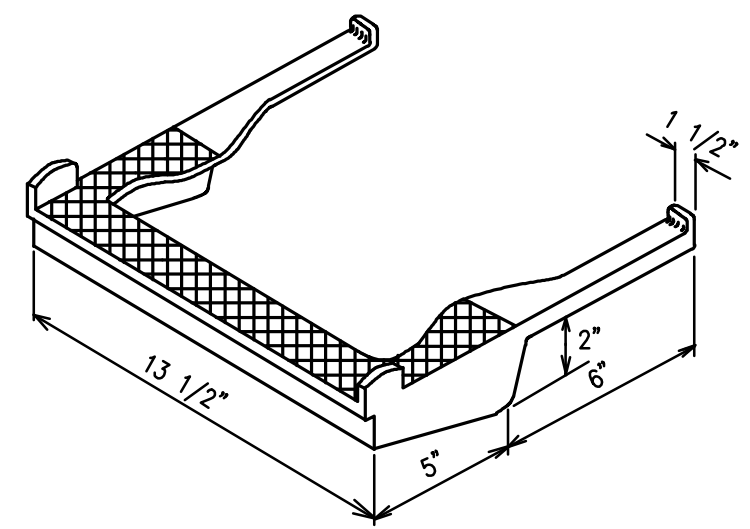
SECTION

### STANDARD FRAME AND COVER

EJIW #1040 TYPE A



### STANDARD UNDERDRAIN



### STANDARD MANHOLE STEP

EJIW 8502

REVISIONS:  
ADOPTED JUNE 2018  
###  
###  
###  
###  
###

DATE: JUNE 2018  
PROJECT: CITY OF DEXTER  
SHEET: 1  
CITY: DEXTER  
COUNTY: WASHTENAW  
PROJECT NO.:  
SHEET NO.:  
DATE: JUNE 2018  
PROJECT: CITY OF DEXTER  
SHEET: 1  
CITY: DEXTER  
COUNTY: WASHTENAW  
PROJECT NO.:  
SHEET NO.:

CITY OF DEXTER  
STORM SEWER  
STANDARD DETAILS

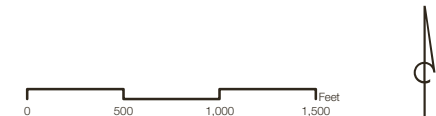
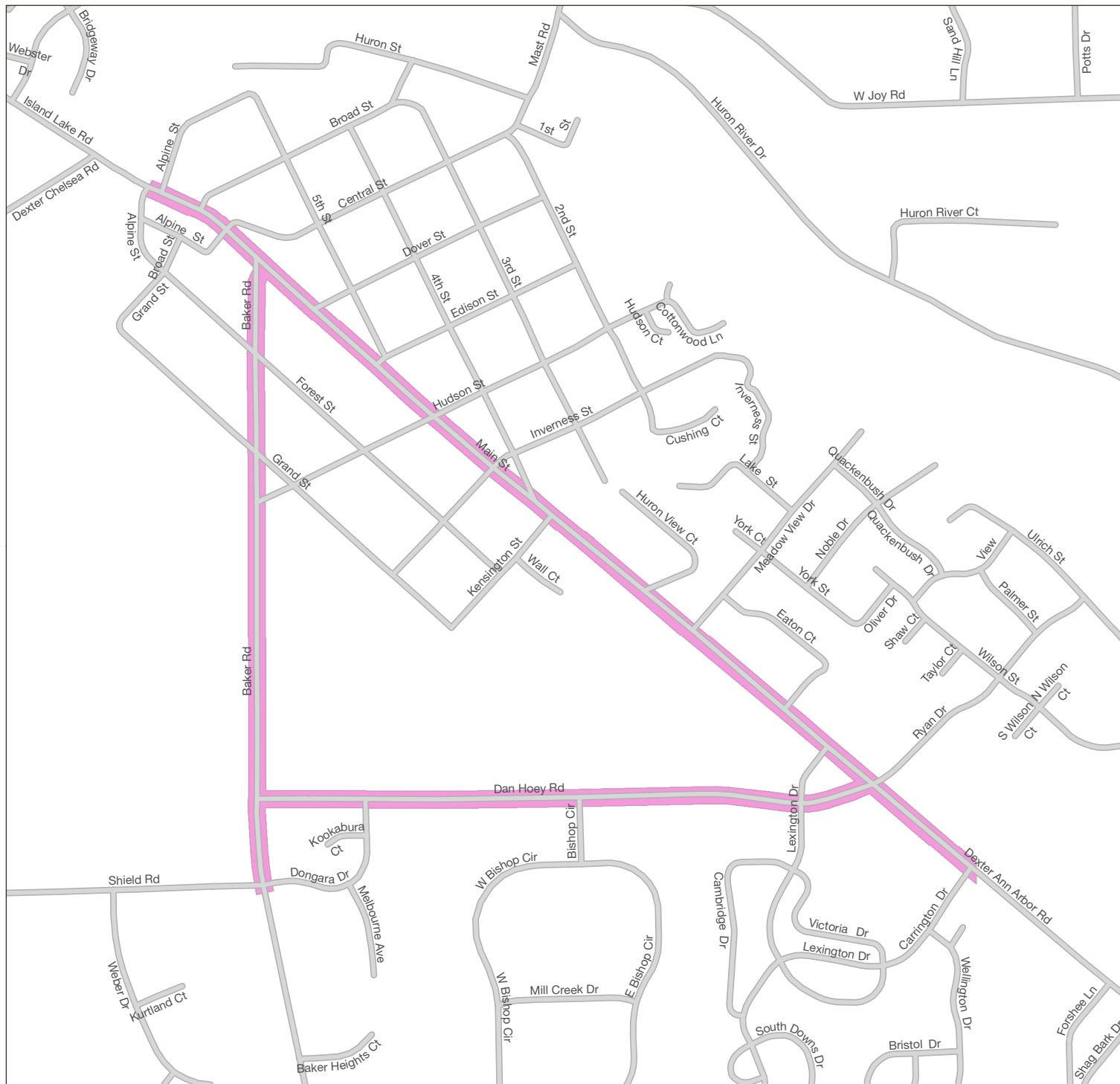
## Storm Sewer Notes

1. All casting rims shall be set to grade as furnished or approved by the City Engineer.
2. All storm sewer pipes shall be C76-IV reinforced concrete pipe unless otherwise noted.
3. All catch basin leads shall be a minimum of 12" diameter C76-IV reinforced concrete pipe.
4. Catch basin and inlet frame covers shall be specified as follows:
  - a. When located in pavement edge gutter line, frame and cover shall be EJIW No. 5080 or equivalent.
  - b. When located in paved areas other than edge gutter line, frame shall be EJIW No. 1040 with type "M" cover or equivalent.
  - c. When located in yard areas, frames shall be EJIW No. 1040 with Type "N" cover or equivalent.
5. Manhole steps will be reinforced polypropylene plastic #PS-2-PFS or approved equal.
6. Rubber joints shall be used in locations where the hydraulic gradient is above the pipe and when storm sewer is located in an easement area.

# MASTER PLANNED 120-ft RIGHT-OF-WAY

Baker, Dan Hoey,  
Dexter-Ann Arbor,  
and Main St

City of Dexter



**Source:** Data provided by Washtenaw County, OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

**Coordinate System:** Michigan South NAD 1983 State Plan International Feet

**Map Published:** November 3, 2011



888.522.6711 | ohm-advisors.com



The classic elegance of acorn street lamps adorned metropolitan avenues, residential streets, and plazas during the early 20th Century. The GranVille series captures the essence of this bygone era while incorporating the most advanced technology available today.

**Features of GranVille® Series:**

- *Pedestrian-scale*
- *Permanent, durable borosilicate glass*
- *Prismatic light control*
- *Four lighting distributions*
- *Lunar Optics™ option (IESNA Cutoff)*
- *Five decorative housing choices*
- *Decorative trim variety*

**Features of Cast Aluminum Posts**

- *Cast Aluminum is cost effective.*
- *Cast aluminum is lighter weight for easier installation.*
- *Cast Aluminum can produce finer casting detail.*

Catalog Number <b>Z NY 12 F417 CA DG GV 100HP 12 L N 3 N C U</b>	
Notes	Type

## SPECIFICATIONS

### POST

North Yorkshire Series Cast Aluminum Post 17" Dia. Base, Extruded Shaft

- 12'-0" post height
- #Z NY 12 F417 CA DG

### ARM

None.

### LUMINAIRE

GranVille® Series

- mounts to 3T3 tenon
- #GV 100HP 12 L N 3 N C U

### ACCESSORIES

None.

### INSTALLATION

A door shall be provided in the base for anchorage and/or wiring access.

- 12.00"Ø bolt circle.
- 0.75" x 18" L-type, hot-dip galvanized anchor bolts. 55000 psi.

### FINISH

All metal parts are finished with a Dark Green polyester powder coat

- #N

## GRANVILLE® LUMINAIRE NORTH YORKSHIRE

Cast Aluminum Lighting Post

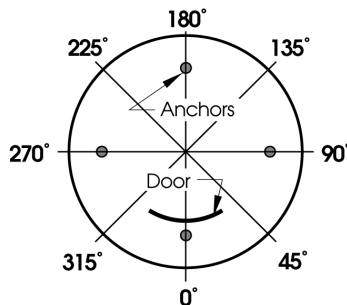


### Dimensions

- Overall Street Lamp Height: 15'-8"

### Anchorage/Orientation Plan

*Street Side*



### Wind Loads

Windloading for this post and accessories has been checked for the 70 mph winds where the post will be installed and has passed.

Customer Approval:

Job Name: **Favorites**

Client Name: \_\_\_\_\_

signature

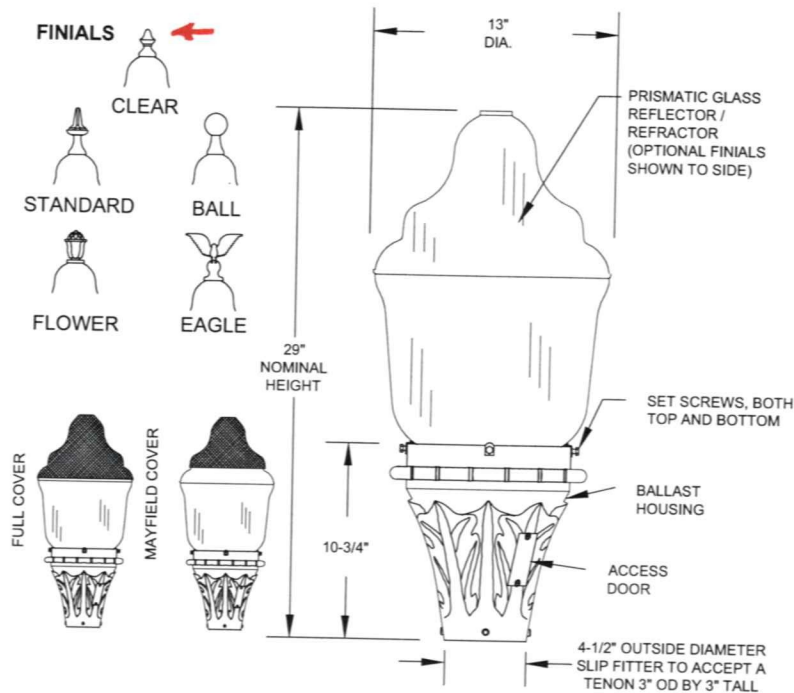
date

Created By: Thomas Balog

Date: 17-Jul-07

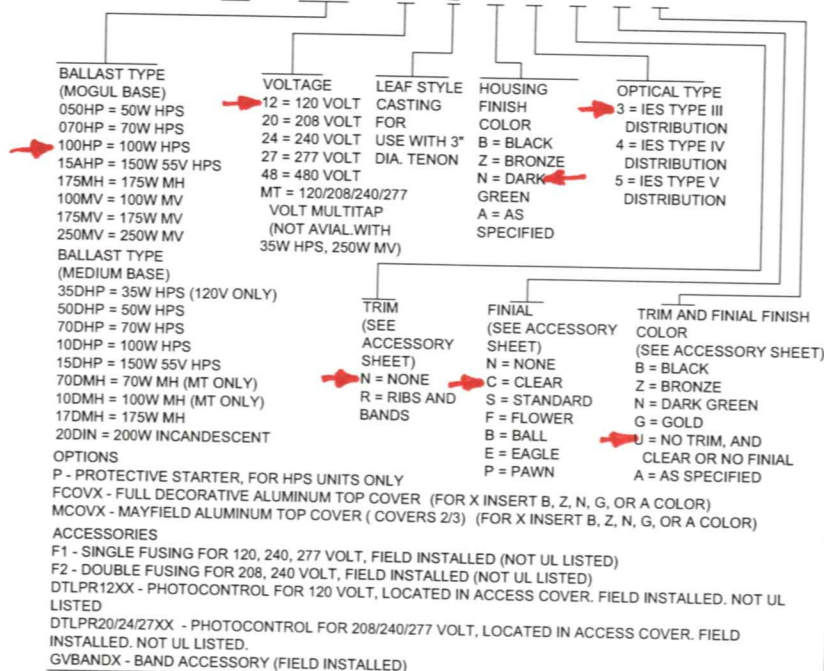
# GRANVILLE® SERIES LUMINAIRE LEAF STYLE CASTING

MAXIMUM WEIGHT - 47 lbs.  
MAXIMUM EFFECTIVE PROJECTED AREA - 1.26 sq. ft.



## ORDERING INFORMATION

EXAMPLE: **GV** **050HP** **12** **L** **B** **3** **N** **N** **U**  
**GV**



## Specifications

### GENERAL DESCRIPTION

The luminaire consists of three main components, a ballast housing, a reflector with socket, and a prismatic glass optical assembly.

### OPTICAL ASSEMBLY

The optical assembly is a precisely molded thermal resistant borosilicate glass reflector and refractor with or without decorative finial. The upper portion of this system incorporates a series of reflecting prisms that redirect over 50% of the upward light in to the controlling refractor while allowing a soft upward component to define the traditional acorn shape of the luminaire. Two decorative aluminum top covers are available. The lower portion uses precisely molded refracting prisms to control the distribution of light to maximize utilization, uniformity, and luminaire spacing. Three unique optical assemblies are available, designed for IES type III, IV, and V lighting distributions.

### BALLAST HOUSING

The ballast housing contains the ballast and other electrical components. The housing is cast of aluminum alloy with a raised oak leaf pattern and is designed to flow gracefully from a 4\" - 5\" diameter decorative post. The slipfitter will accept a 3\" high, 2-7/8\" to 3-1/8\" O.D. tenon and is secured by four hex head 1/4-20 set screws. Four uniquely designed stainless steel spring clips enclosed in a clear polyvinyl chloride sleeve and adjusted by hex head 1/4-20 bolts securely cradle the optical assembly.

### BALLAST

(Refer to Ballast Data Sheet for specific operating characteristics)

35 - 100 watt 120 volt High Pressure Sodium (HPS) ballasts are High Power Factor Reactor type. All other HPS ballasts are High Power Factor Autotransformer type. 175 watt Metal Halide (MH) ballasts are Peak Lead Autotransformer type. 70 and 100 watt MH units are available only with (120V, 208V, 240V, 277V) multitap High Power Factor High Reactance type ballast. All Mercury Vapor (MV) ballasts are High Power Factor Constant Wattage Autotransformer (CWA) type.

### REFLECTOR / SOCKET ASSEMBLY

The reflector/socket assembly is designed to position the specified light source at the light center of the refractor.

### INSTALLATION

Refer to the instruction manual provided with each luminaire as to the specific method of wiring and mounting the luminaire.

### FINISH

The housing is finished with polyester powder paint applied after a seven stage pretreatment process to insure maximum durability.

### UL LISTING

The luminaire is UL listed as suitable for wet locations at a maximum 40 degree C ambient temperature.

ARCHITECTURAL OUTDOOR ORDER #:

TYPE:

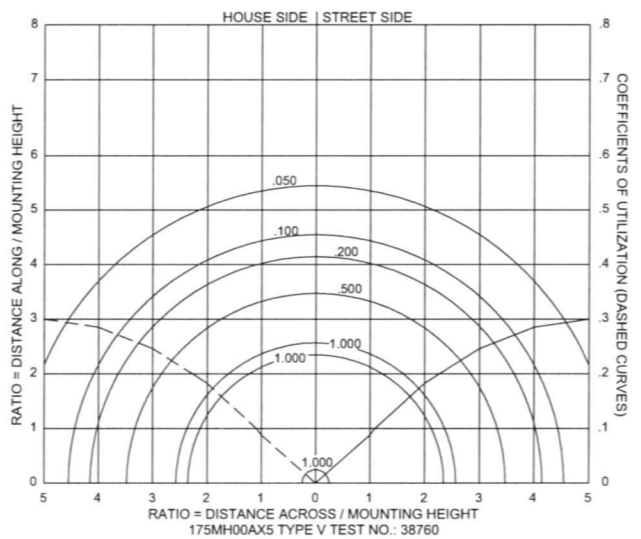
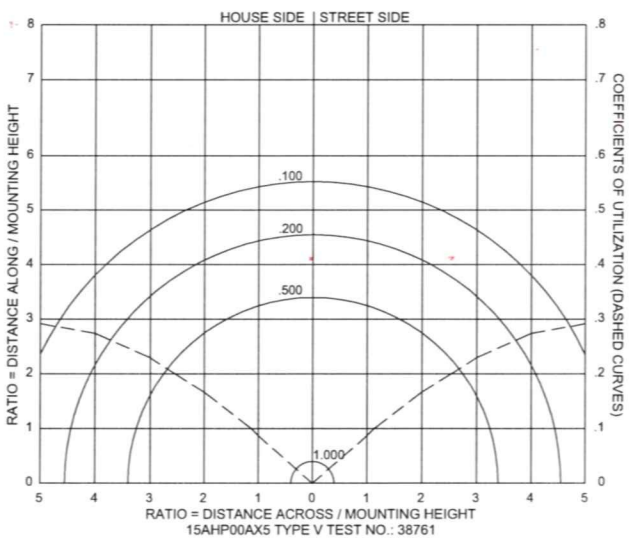
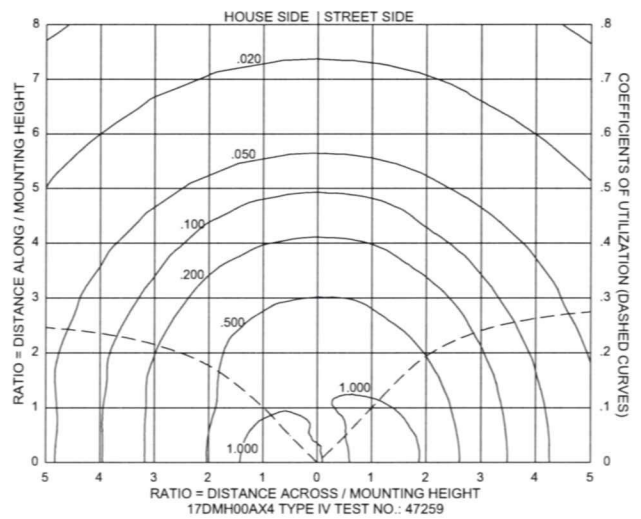
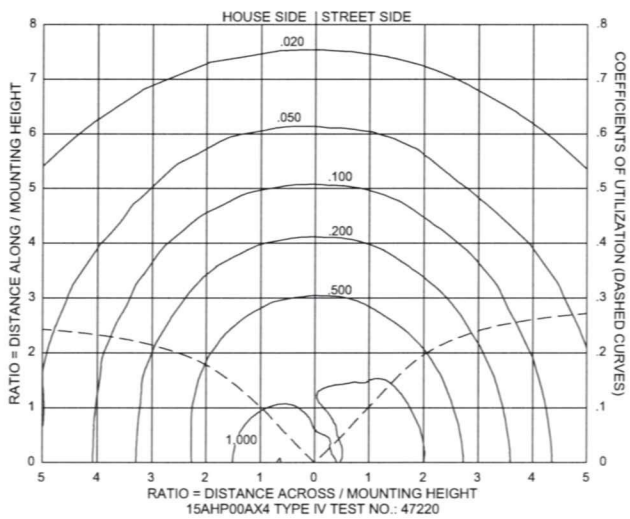
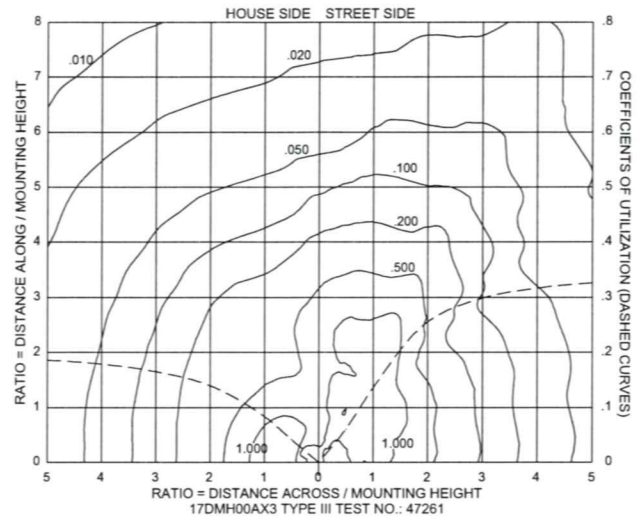
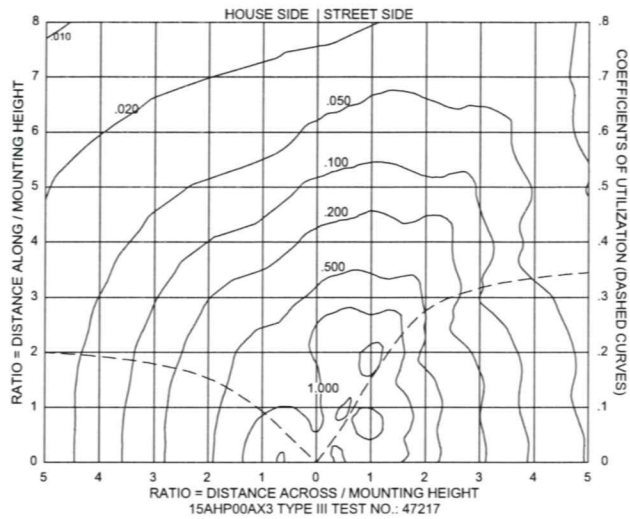
DRAWING NO: US-2514

THIS DRAWING, WHEN APPROVED, SHALL BECOME THE COMPLETE SPECIFICATION FOR THE MATERIAL TO BE FURNISHED BY HOLOPHANE ON THE ORDER NOTED ABOVE. A UNIT OF SIMILAR DESIGN MAY BE SUPPLIED, BUT ONLY AFTER APPROVAL BY THE CUSTOMER IN WRITING. ON POLE ORDERS AN ANCHOR BOLT TEMPLATE PRINT WILL BE SUPPLIED WITH EACH ANCHOR BOLT ORDER TO MATCH THE POLE PROVIDED.

THIS PRINT IS THE PROPERTY OF HOLOPHANE AND IS LOANED SUBJECT TO RETURN UPON DEMAND AND UPON EXPRESS CONDITION THAT IT WILL NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO OUR INTERESTS, AND ONLY IN CONNECTION WITH MATERIAL FURNISHED BY HOLOPHANE.

**HOLOPHANE**  
LEADER IN LIGHTING SOLUTIONS  
An Acuity Brands Company  
214 OAKWOOD AVENUE - NEWARK, OHIO 43055

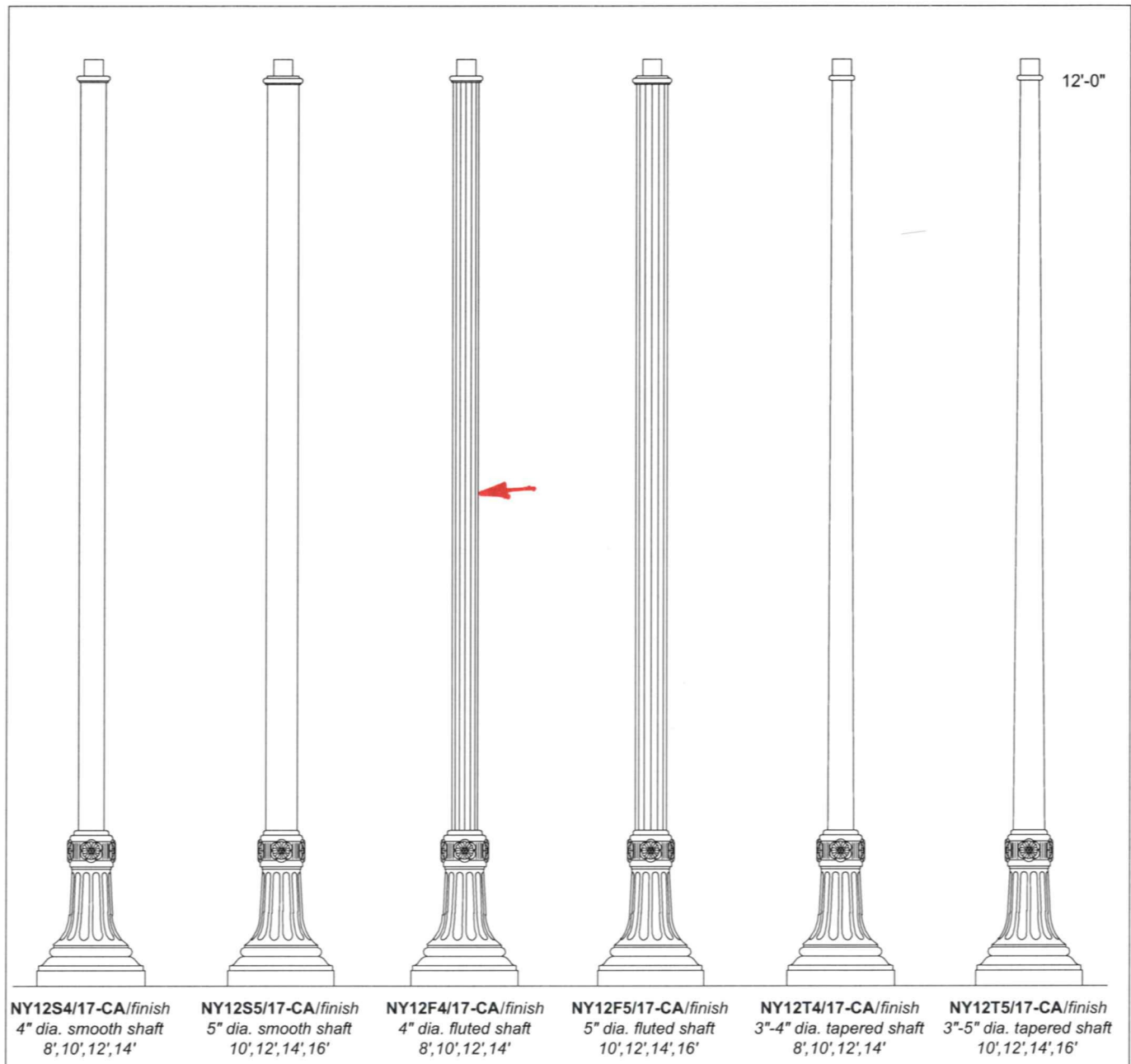
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APP'D:  
DATE: 05-01-03



## Cast Aluminum Posts extruded shafts

## NORTH YORKSHIRE Series

17" dia. base



### SPECIFICATIONS

**DESCRIPTION** The lighting post shall be all aluminum, one-piece construction, with a classic tapered and fluted base design. The shaft shall be \_\_\_\_\_ (insert shaft options from back page) The post shall be Holophanes' catalog number NYXXXX/17-CA/finish.

**MATERIALS** The base shall be heavy wall, cast aluminum produced from certified ASTM 356.1 ingot per ASTM B-179-95a or ASTM B26-95. The straight shafts shall be extruded from aluminum, ASTM 6061 alloy, heat treated to a T6 temper. The tapered shaft shall be extruded from aluminum, ASTM 6063 alloy, spun to a tapered shape, then heat treated to a T6 temper. All hardware shall be tamper resistant stainless steel. Anchor bolts to be completely hot dip galvanized.

**CONSTRUCTION** The shaft shall be double welded to the base casting and shipped as one piece for maximum structural integrity. The shaft shall be circumferentially welded inside the base casting at the top of the access door, and externally where the shaft exits the base. All exposed welds below 8' shall be ground smooth. All welding shall be per ANSI/AWS D1.2-90. All welders shall be certified per Section 5 of ANSI/AWS D1.2-90.

**DIMENSIONS** The post shall be X'- XX" in height with a 17" diameter base. The shaft diameter shall be XX". (see back page) At the top of the post, an integral 3" O.D. tenon with a transitional donut shall be provided for luminaire mounting.

**INSTALLATION** The post shall be provided with four, hot dip galvanized L-type anchor bolts to be installed on a 12" diameter bolt circle. A door shall be provided in the base for anchorage and wiring access. A grounding screw shall be provided inside the base opposite the door.

For finish specifications and color options, see " Finish" section in catalog.

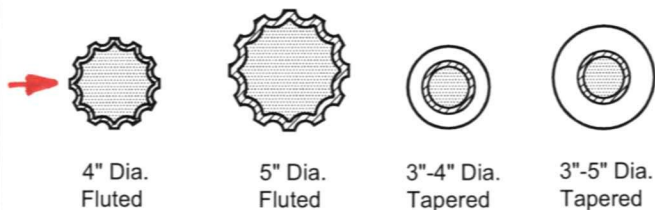
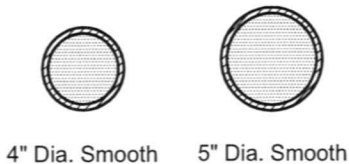
  
**HOLOPHANE** An Acuity Brands Company  
LEADER IN LIGHTING SOLUTIONS 214 OAKWOOD AVENUE - NEWARK, OHIO 43055

US-1628

# NORTH YORKSHIRE Series

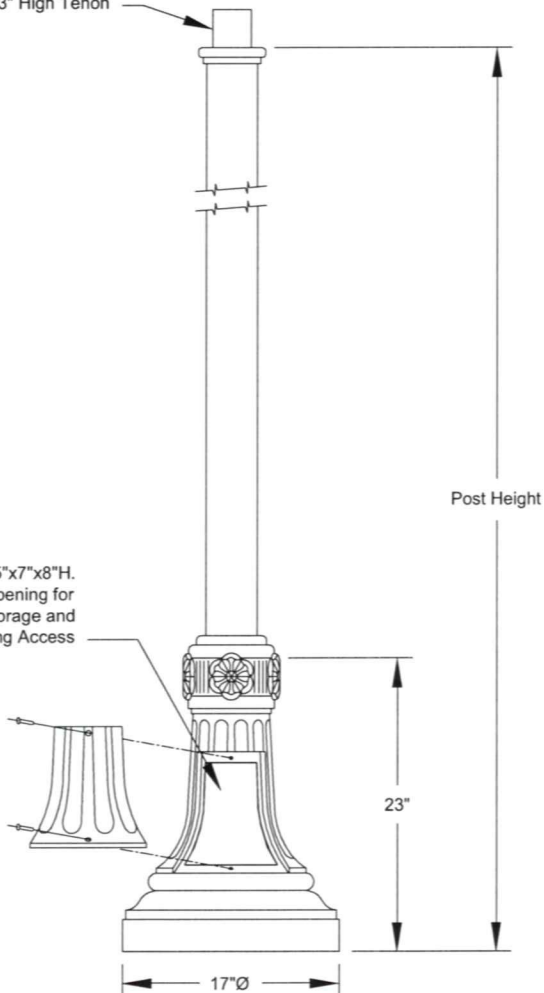
## Cast Aluminum Posts

### SHAFT OPTIONS



3" O.D. x 2.63" High Tenon

3.5"x7"x8"H.  
Door Opening for  
Anchorage and  
Wiring Access



## Ordering Guide

### sample catalog number

NY12S4/17 - CA/BK - WPRT

Post	material/finish	options
NORTH YORKSHIRE 12'- Smooth 4" shaft 17" dia. base	Cast Aluminum Black	Weatherproof Receptacle at Top (of post)

Post	(check appropriate boxes, add height in blank)	
Catalog #	Shaft type	Heights
<input type="checkbox"/> NY_S4/17	4" dia. smooth	8', 10', 12', 14'
<input type="checkbox"/> NY_S5/17	5" dia. smooth	10', 12', 14', 16'
<input type="checkbox"/> NY_F4/17	4" dia. fluted	8', 10', 12', 14'
<input type="checkbox"/> NY_F5/17	5" dia. fluted	10', 12', 14', 16'
<input type="checkbox"/> NY_T4/17	3" - 4" dia. tapered	8', 10', 12', 14'
<input type="checkbox"/> NY_T5/17	3" - 5" dia. tapered	10', 12', 14', 16'

### Material/Finish

Catalog Suffix	Description
<input type="checkbox"/> -CA/BK	Cast Aluminum/Black (std.)
<input type="checkbox"/> -CA/DG	Cast Aluminum/Dark Green
<input type="checkbox"/> -CA/DB	Cast Aluminum/Dark Bronze
<input type="checkbox"/> -CA/PP	Cast Aluminum/Prime Painted
<input type="checkbox"/> -CA/CC	Cast Aluminum/Custom Color

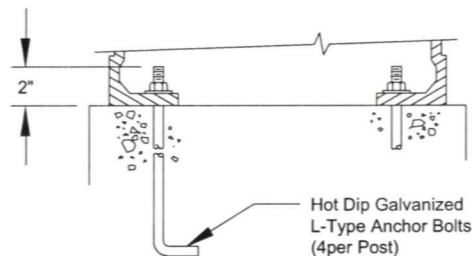
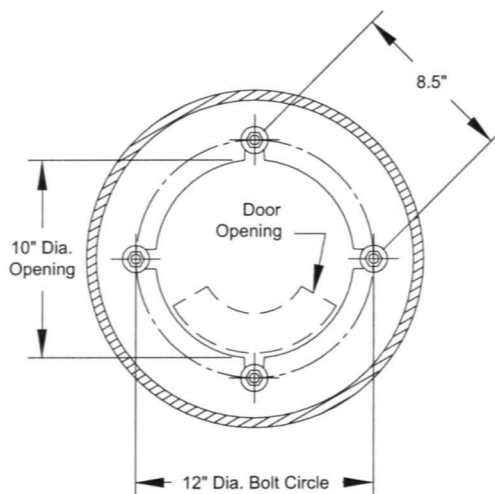
(for complete finish and color options, see "Finish" section in catalog)

### Optional Equipment

Catalog Suffix	Description
<input type="checkbox"/> -	Receptacles (see Accessories section)
<input type="checkbox"/> -	Banner Arms (see Accessories section)
<input type="checkbox"/> -	Flag Pole Holders (see Accessories section)
<input type="checkbox"/> -	Custom Logos (see Accessories section)
<input type="checkbox"/> -	Signage (see Signage section)

(for optional equipment not found in catalog, consult factory)

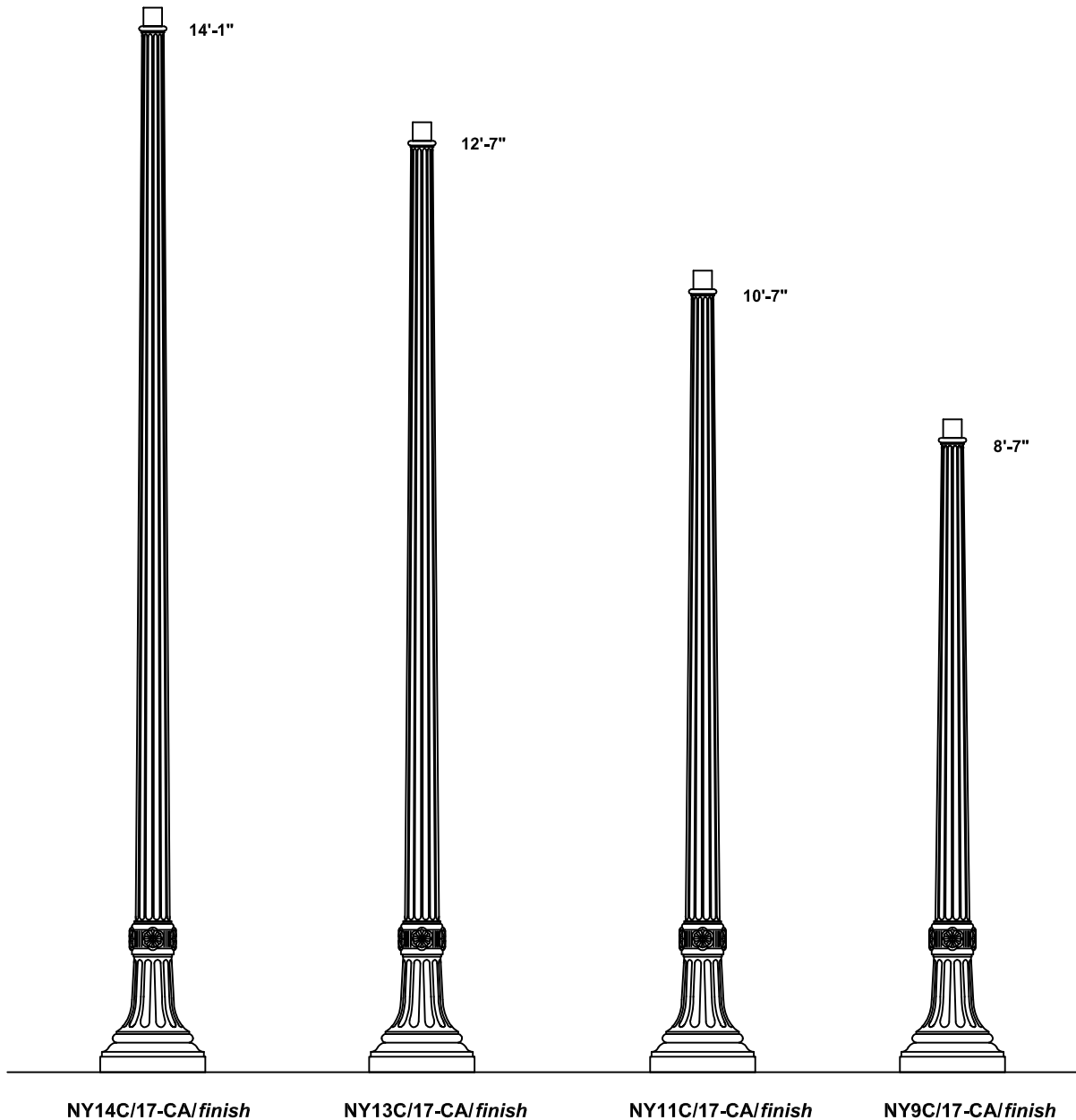
## ANCHORAGE GUIDE



# Cast Aluminum Posts tapered fluted shafts

## NORTH YORKSHIRE Series

17" dia. base



### SPECIFICATIONS

**DESCRIPTION** The post shall be all cast aluminum construction with a classic tapered and fluted base and a gracefully tapered 12-flute cast shaft. The post shall be Holophanes' catalog number NYXXC/17-CA/finish.

**MATERIALS** The post shall be heavy wall, cast aluminum produced from certified ASTM 356.1 ingot per ASTM B179-95a or ASTM B26-95. The castings shall be formed true to the pattern with complete detail. All hardware shall be tamper resistant stainless steel. Anchor bolts to be completely hot dip galvanized.

**CONSTRUCTION** The cast shaft shall be circumferentially welded to the base casting and shipped as one piece for maximum structural integrity. All exposed welds below 8' shall be ground smooth. All welding shall be per ANSI/AWS D1.2-90. All welders shall be certified per Section 5 of ANSI/AWS D1.2-90.

**DIMENSIONS** The post shall be X'- XX" in height with a 17" diameter base. The shaft diameter shall taper from 3.5" at the top to 5.5" above the base. An integral 3" O.D. tenon shall be provided at the top for luminaire mounting. The post top shall include a transitional donut between the fluted shaft and the tenon.

**INSTALLATION** The post shall be provided with four, hot dip galvanized L-type anchor bolts to be installed on a 12" bolt circle. A door shall be provided in the base for anchorage and wiring access. A grounding screw shall be provided inside the base opposite the door.

For finish specifications and color options, see "Finish" section in catalog.

  
**HOLOPHANE**® An **Acuity Brands Company**  
LEADER IN LIGHTING SOLUTIONS 214 OAKWOOD AVENUE • NEWARK, OHIO 43055

# NORTH YORKSHIRE Series

## Cast Aluminum Posts

## ORDERING GUIDE

sample catalog number

NY14C/17	-	CA/BK	-
Post	-	material / finish	- options

NORTH YORKSHIRE  
14'-1" Height  
Cast Shaft

Cast Aluminum  
Black

**Post** (check appropriate boxes, add height in blank)

Catalog #	Heights
<input type="checkbox"/> NY9C/17	8'-7"
<input type="checkbox"/> NY11C/17	10'-7"
<input type="checkbox"/> NY13C/17	12'-7"
<input type="checkbox"/> NY14C/17	14'-1"

### Material/Finish

Catalog Suffix	Description
<input type="checkbox"/> -CA/BK	Cast Aluminum/Black (std.)
<input type="checkbox"/> -CA/DG	Cast Aluminum/Dark Green
<input type="checkbox"/> -CA/DB	Cast Aluminum/Dark Bronze
<input type="checkbox"/> -CA/PP	Cast Aluminum/Prime Painted
<input type="checkbox"/> -CA/CC	Cast Aluminum/Custom Color

(for complete finish and color options, see "Finish" section in catalog)

### Optional Equipment

Catalog Suffix	Description
<input type="checkbox"/> -	Receptacles (see Accessories section)
<input type="checkbox"/> -	Banner Arms (see Accessories section)
<input type="checkbox"/> -	Flag Pole Holders (see Accessories section)
<input type="checkbox"/> -	Custom Logos (see Accessories section)
<input type="checkbox"/> -	Signage (see Signage section)

(for optional equipment not found in catalog, consult factory)

3" O.D. x 3"  
High Tenon

Ø 3.5"

NY9C/17 : 8'-7"  
NY11C/17 : 10'-7"  
NY13C/17 : 12'-7"  
NY14C/17 : 14'-1"

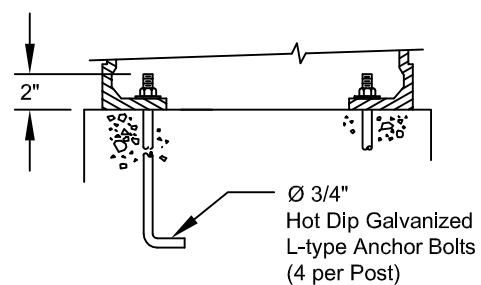
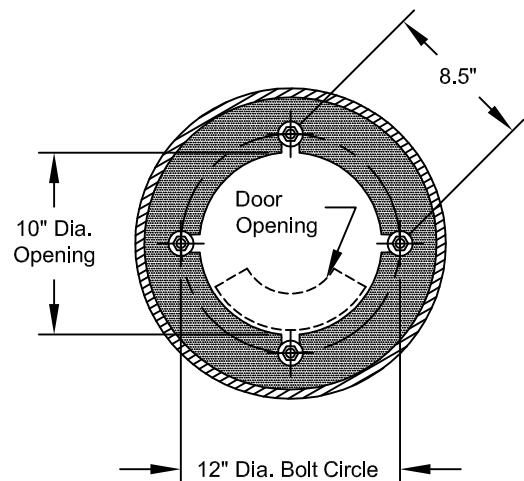
3.5"x7"x8" H.  
Door Opening for  
Anchorage and  
Wiring Access

Ø 5.5"

23"

Ø 17"

## ANCHORAGE GUIDE



# GRANVILLE® PREMIER LUNAR OPTICS®

## Featuring a New Performance Optical Design

- Meets IES Cutoff Requirements
- A 30% Performance Enhancement Over Existing Lunar Optic Systems
- Less than 5% uplight component

## Product Features

- IP66 Optical Assembly
- Tool-less Entry
- Utility Ballast Module
- Integral Re-Lamping Without Removing the Glass
- Source Availability up to 250W MH and 150W HPS



## Ease of Maintenance



HL-2383 1/08



| DECORATIVE

| Historical

# GRANVILLE® PREMIER

Featuring ISD SuperGlass® with Cutoff Optics

| DECORATIVE

| Historical



## Preferred Selections:

Most Frequently Ordered Catalog Number

GVP	175MH	MA	M	B	6	R	S	B
1	2	3	4	5	6	7	8	9
LUMINAIRE	WATTAGE	VOLTAGE	HOUSING	COLOR	OPTICS	TRIM	FINIAL	TRIM FINISH
GVP	175MH 250MH	MA	M	B	6	R	S	B

Holophane's new Cutoff optical design utilizes a precision segmented Miro® 4 reflector design to control up-light and a bottom prismatic glass refractor to provide a very uniform distribution pattern.

Miro® 4 is a Registered Trade Mark of Alanod



## Catalog Numbers for Entire Product Offering

(Pricing and lead times may be affected)

STEP 1: LUMINAIRE	
GVP GranVille Premier	
STEP 2: SOURCE AND WATTAGE	
<b>HIGH PRESSURE SODIUM</b>	
<b>Medium Base</b>	
50DHP	50W HPS
70DHP	70W HPS
10DHP	100W HPS
15DHP	150W/55V HPS
<b>Mogul Base</b>	
050HP <sup>1</sup>	50W HPS
070HP	70W HPS
100HP	100W HPS
15AHP	150W/55V HPS
<sup>1</sup> Not available with 347V	

STEP 2: WATTAGE (CONTINUED)	
<b>METAL HALIDE</b>	
<b>Medium Base</b>	
70DMH <sup>2</sup>	70W MH
10DMH <sup>2</sup>	100W MH
15DMH <sup>2</sup>	150W MH
17DMH	175W MH
<b>Mogul Base</b>	
175MH	175W MH
250MH	250W MH
<b>INCANDESCENT</b>	
20DIN	200W Inc
<b>COMPACT FLUORESCENT</b>	
42CFL	42W CFL
57CFL	57W CFL
70CFL	70W CFL
<b>INDUCTION</b>	
055QL <sup>3</sup>	55W Ind
085QL <sup>3</sup>	85W Ind
<sup>1</sup> Not available with 347V	
<sup>2</sup> Not available with 480V	
<sup>3</sup> 35°C maximum ambient	
STEP 3: VOLTAGE	
08 <sup>1</sup>	208V
12	120V
20	208V
24	240V
27	277V
34	347V
40 <sup>1</sup>	240V
48	480V
<b>Multi-tap, factory installed</b>	
MA	120 volt only
MB	208 volt only
MC	240 volt only
MD	480 volt only
<sup>1</sup> Isolated secondary. Not available with "CFL", "70DMH", "10DMH", "15DMH", and "QL"	

STEP 4: HOUSING	
M	Modern fluted swing open design
STEP 5: COLOR	
B	Black
N	Green
Z	Bronze
A	As specified
STEP 6: OPTICS	
3	Asymmetric
5	Symmetric
6	Asymmetric, with Lunar Optics
8	Symmetric, with Lunar Optics
STEP 7: TRIM	
B	Band only
N	No trim
R	Band and ribs
STEP 8: FINIAL	
<b>Painted Cast Aluminum</b>	
B	Ball
E	Eagle
F	Flower
P	Pawn
R	Cross
S	Standard
<b>Other</b>	
C	Clear Acrylic, 3"
N	None

STEP 9: TRIM FINISH	
B	Black
N	Green
Z	Bronze
A	As specified
U	No trim and clear or no finial
STEP 10: OPTIONS/ACCESSORIES	
<b>DTL Twist-off photocontrols</b>	
PCTWSTL120	120 volt
PCTWSTL1202427	120-277 volt
PCTWSTL480	480 volt
PCTWSTLSHRTCAP	Shorting cap
FCVRX <sup>1</sup>	Full decorative aluminum cover for "GV" (finial required)
H	NEMA twist-off photocontrol
NEMA-XXXXX	NEMA labels. Insert wattage for "XXXXX"
P	Protected starter for HPS units
S	Orient door with street
<b>Pre-wired leads</b>	
LEADS-XXX-FT10GA	Pre-wired leads. Insert length for "XXX"
<sup>1</sup> For color insert "B", "G", "N", "Z" or "A" for "X"	



An AcuityBrands Company

### Acuity Brands Lighting, Inc.

Holophane Headquarters, 3825 Columbus Road, Granville, OH 43023

Holophane Canada, Inc. 9040 Leslie Street, Suite 208, Richmond Hill, ON L4B 3M4

Holophane Europe Limited, Bond Ave., Milton Keynes MK1 1JG, England

Holophane, S.A. de C.V., Apartado Postal No. 986, Naucalpan de Juarez, 53000 Edo. de Mexico

Contact your local Holophane factory sales representative for application assistance, and computer-aided design and cost studies. For information on other Holophane products and systems, call the Inside Sales Service Department at 740-345-9631. In Canada call 905-707-5830 or fax 905-707-5695.

**Limited Warranty and Limitation of Liability** Refer to the Holophane limited material warranty and limitation of liability on this product, which are published in the "Terms and Conditions" section of the current Buyers Guide, and is available from your local Holophane sales representative.

experience  
lighting's  
best.

# Cutoff Classification

---



**Full Cutoff:** Zero candela (intensity) at or above horizontal (90° above nadir) and limited to a value not exceeding 10% of lamp lumens at a vertical angle of 80° above nadir.

**Benefits:**

- Perceived reduction in sky glow
- Excellent light control at property line
- Limits spill light
- Reduces glare

**Uplight:**

- No uplight allowed

**Limitations:**

- Reduces pole spacing
- Increases pole and luminaire quantity
- Least cost effective of all cutoff categories
- Concentrated down light component results in maximum reflected uplight
- Potential to have decreased uniformity due to higher light levels directly under the pole

**Cutoff:** Intensity at or above 90° to no more than 2.5% of lamp lumens, and no more than 10% of lamp lumens at a vertical angle of 80° above nadir

**Benefits:**

- Small increase in high-angle light compared to full cutoff
- Good light control at property line
- Potential for increased pole spacing and lower overall power consumption when compared to full cutoff

**Limitations:**

- Can allow uplight, a problem when uplight is not desired
- Light control at property line less than full cutoff
- Reflected light off pavement can increase sky glow

**Uplight:**

- From as little as 0% to a maximum 16%

**Semi-Cutoff:** Intensity at or above 90° to no more than 5% of lamp lumens, and no more than 20% of lamp lumens at a vertical angle of 80° above nadir

**Benefits:**

- Potential for increased pole spacing and lower overall power consumption when compared to cutoff
- High angle light accents taller surfaces
- Less reflected light off pavement than cutoff luminaires
- Vertical illumination increases pedestrian security & sense of safety

**Limitations:**

- Greater potential for direct uplight component than Cutoff
- Light trespass a concern near residential areas
- Increased high angle light compared to cutoff

**Uplight:**

- Less than 1% to a maximum 32%

**Non-Cutoff:** No intensity limitations on light distributions at any angle

**Benefits:**

- Potential for increased pole spacing and lower overall power consumption when compared to semi-cutoff
- Accents taller surfaces
- Highest vertical illumination increases pedestrian safety & security
- Excellent uniformity
- Least amount of reflected light off pavement
- "Open visual environment" provides great visibility

**Limitations:**

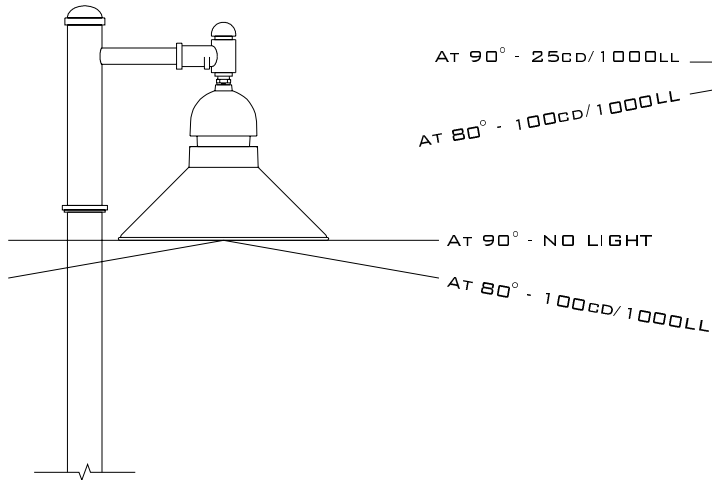
- Greatest potential for direct uplight component of all classifications
- Least control of direct uplight
- Least control of aiming
- Increased high angle light compared to semi-cutoff

**Uplight:**

- No restriction

# CUTOFF CLASSIFICATION

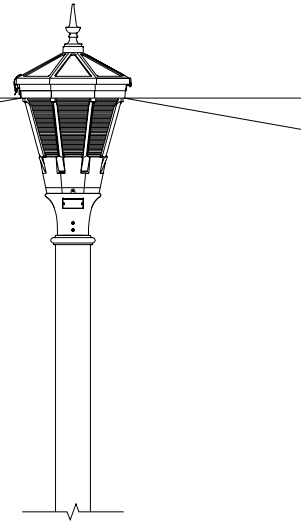
## FULL CUTOFF



### ALLOWS:

- ♦ NO LIGHT AT 90°
- ♦ 100 CD PER 1000 LAMP LUMENS AT 80°

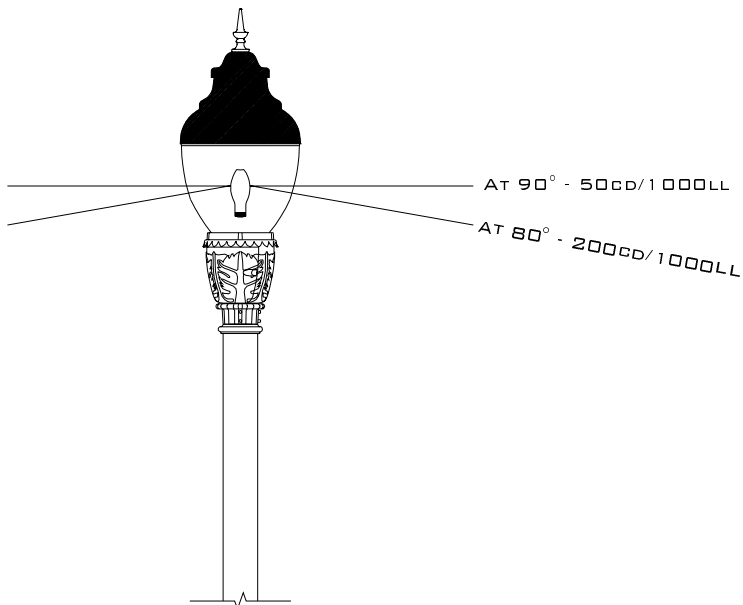
## CUTOFF



### ALLOWS:

- ♦ 25 CD PER 1000 LAMP LUMENS AT 90°
- ♦ 100 CD PER 1000 LAMP LUMENS AT 80°

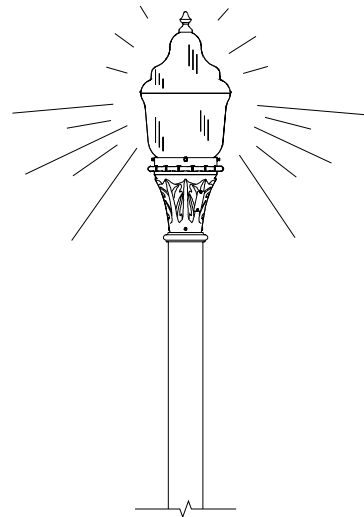
## SEMI-CUTOFF



### ALLOWS:

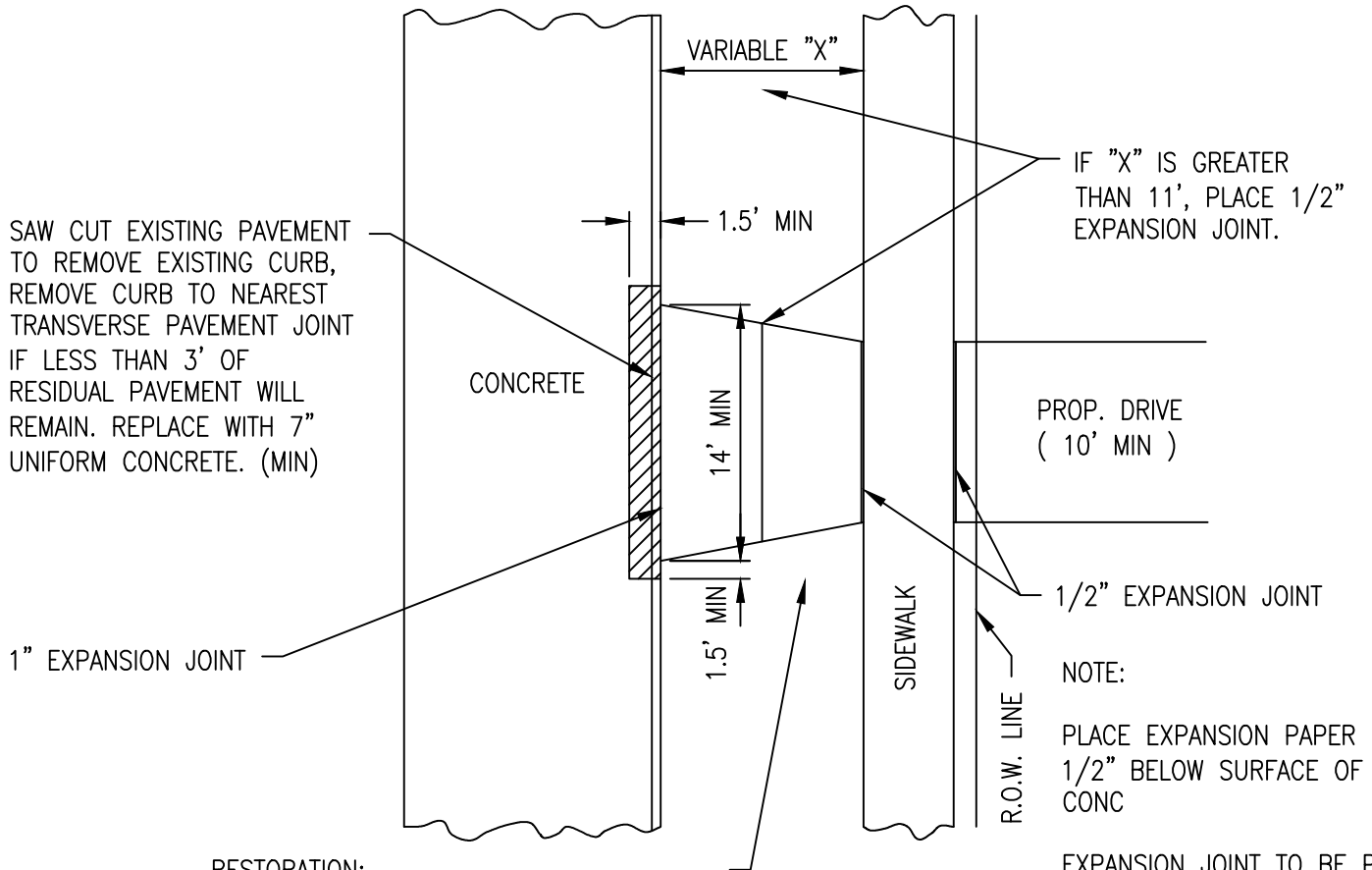
- ♦ 50 CD PER 1000 LAMP LUMENS AT 90°
- ♦ 100 CD PER 1000 LAMP LUMENS AT 80°

## NON-CUTOFF



### ALLOWS:

- ♦ UNRESTRICTED DISTRIBUTION OF LIGHT AT ANY ANGLE

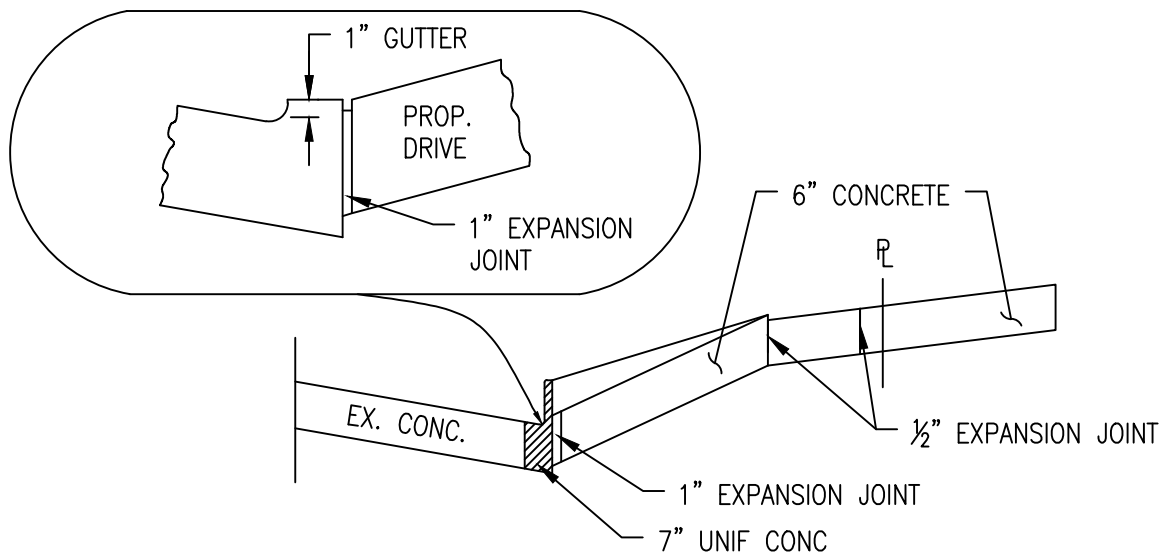


#### RESTORATION:

3" TOPSOIL, SEED AND MULCH ON SLOPES FLATTER THAN 1 ON 4.

SOD ON SLOPES STEEPER THAN 1 ON 4.

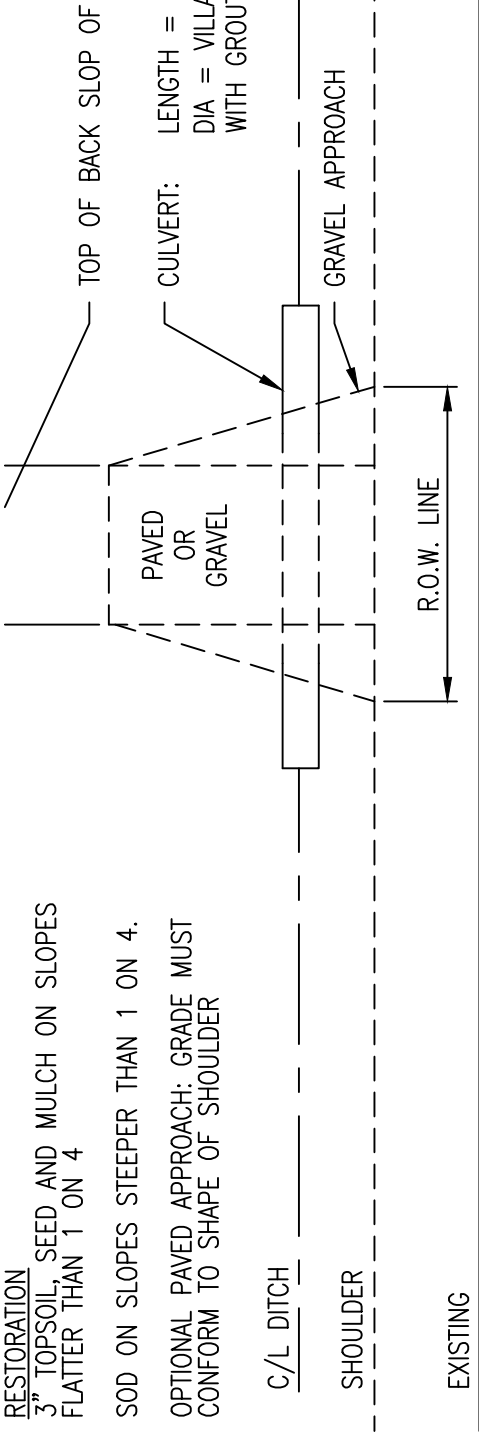
EXPANSION JOINT TO BE PRE MOLDED BITUMINOUS FIBER PAPER IMPREGNATED WITH ASPHALT.



## RESIDENTIAL DRIVEWAY CURBED PAVEMENT

NOT TO SCALE

RESTORATION  
3" TOPSOIL, SEED AND MULCH ON SLOPES  
FLATTER THAN 1 ON 4  
  
SOD ON SLOPES STEEPER THAN 1 ON 4.  
  
OPTIONAL PAVED APPROACH: GRADE MUST  
CONFORM TO SHAPE OF SHOULDER



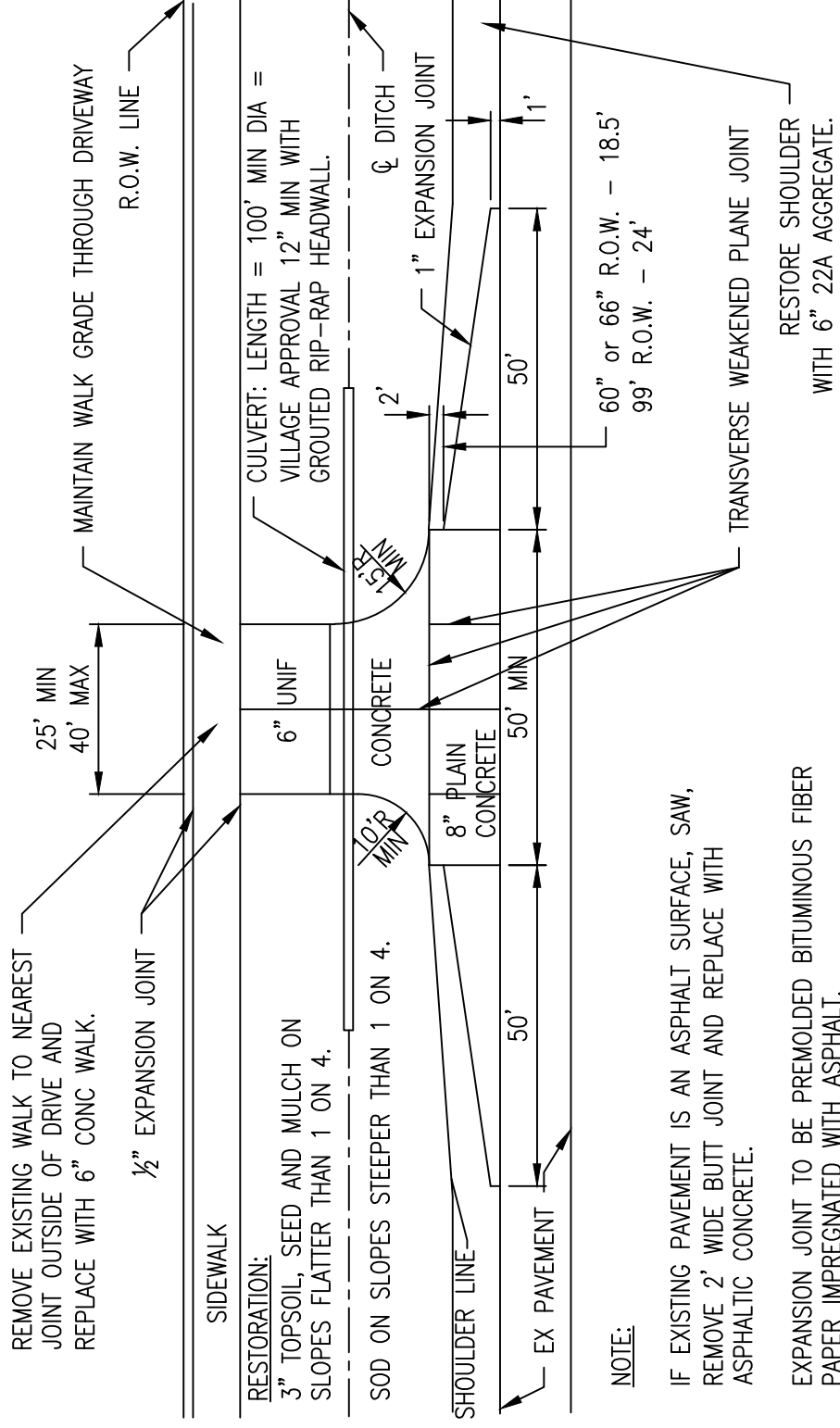
C/L ROAD

PAVEMENT

- DRIVE APPROACHES MAY BE
1. 6" AGGREGATE – 22A
  2. 6" ASPHALT
  3. 6" CONCRETE

RESIDENTIAL DRIVEWAY  
UNCURBED PAVEMENT

NOT TO SCALE

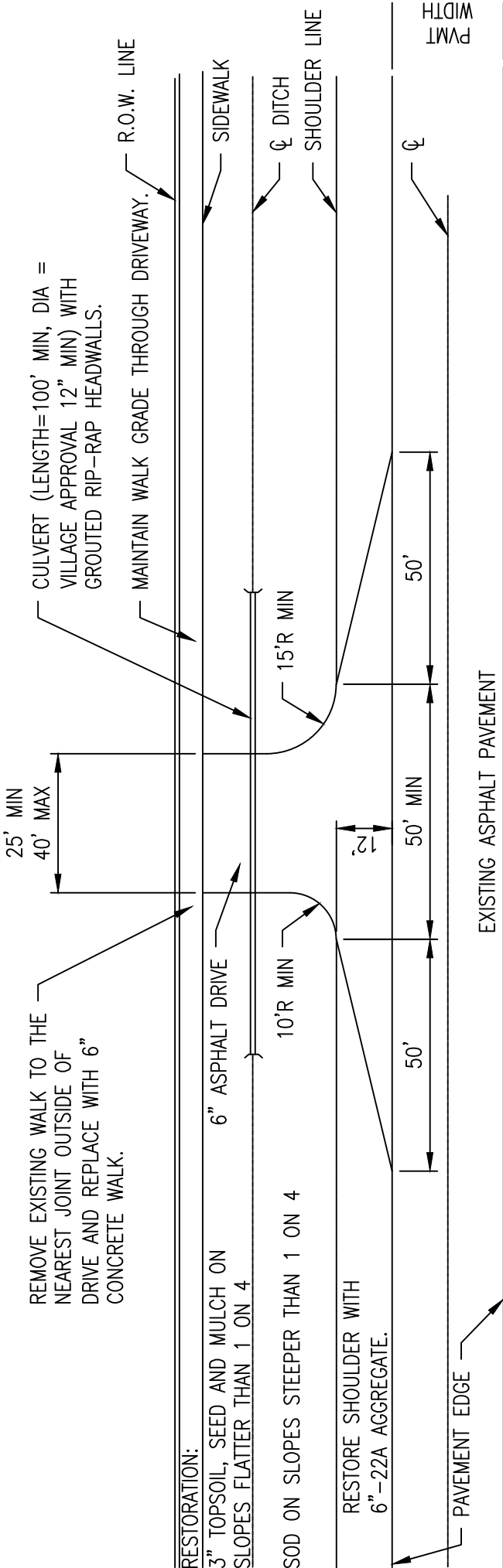


NOTE:

- IF EXISTING PAVEMENT IS AN ASPHALT SURFACE, SAW, REMOVE 2' WIDE BUTT JOINT AND REPLACE WITH ASPHALTIC CONCRETE.
- EXPANSION JOINT TO BE PREMOLDED BITUMINOUS FIBER PAPER IMPREGNATED WITH ASPHALT.
- PLACE EXPANSION PAPER 1/2" BELOW SURFACE OF CONCRETE.

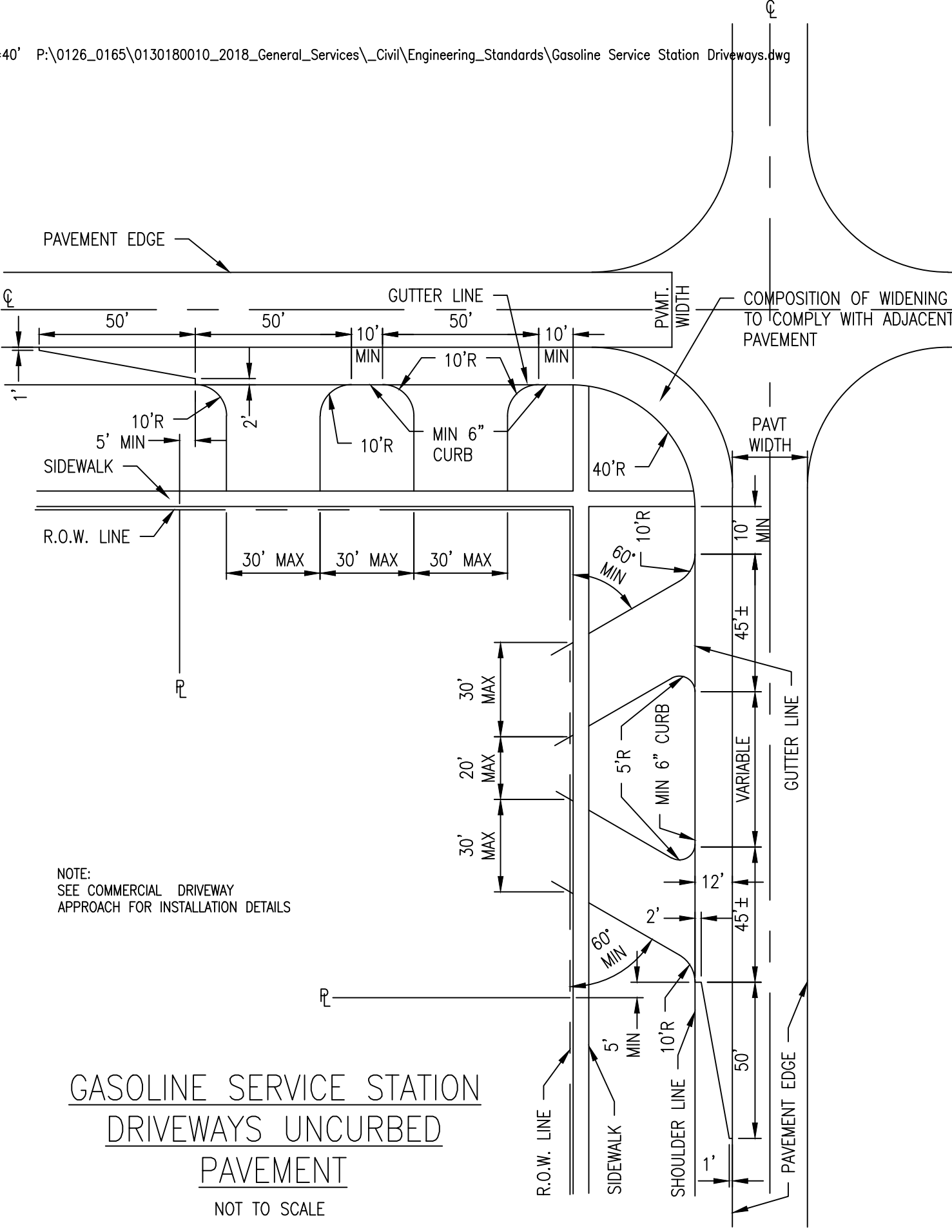
COMMERCIAL CONCRETE DRIVEWAY  
(TWO-WAY)  
UNCURBED PAVEMENT

NOT TO SCALE



COMMERCIAL ASPHALT DRIVEWAY  
(TWO-WAY)  
UNCURBED PAVEMENT

NOT TO SCALE





The diagram illustrates the layout of a container enclosure for MSW and RECYCLABLES. It features two 10 cubic yard top and end loading containers, each measuring 6' L x 6' W x 7'-8" H. The containers are positioned within a concrete pad that is 25'-0" wide and 20'-6" long. The pad is divided into two sections, each 11'-0" wide by the inside enclosure length. The containers are separated by a 2'-3" gap, and each has a 2'-3" gap on its sides. The containers are labeled MSW and RECYCLABLES. The enclosure is bounded by a 3' wide by 7' tall gate (optional) on the left and right sides. The gate is supported by 6" diameter pipe bollards, which are concrete filled and set in concrete 3' below grade, extending 4' above grade and painted OSHA yellow. The gate is held closed by 4"-6" W. bumper X 6"H. and 3/4" diameter by 11 1/2" deep recesses for gate cane bolts, providing two each at the gate in closed and open position. The gate can swing 90 degrees. The concrete pad is designed to withstand 10,000# single wheel loads.

**MSW & RECYCLABLES  
CONTAINER ENCLOSURE PLAN**

25'-0" (concrete pad width)

11'-0" (inside enclosure length)

11'-0" (inside enclosure length)

10'-0" (inside enclosure width)

20'-6" (concrete pad length)

3' wide by 7' tall gate (optional)

2'-3'

2'-3'

2'-3'

2'-3'

10 cubic yard top and end loading container (6' L X 6' W X 7'-8" H.)

MSW

90 deg. swing

6" dia. pipe bollard concrete filled, set in concrete 3' below grade extend 4' above grade, paint OSHA yellow.

4"-6" W. bumper X 6"H.

3/4" diameter by 11 1/2" deep recesses for gate cane bolts. provide two each at gate in closed and open position, field verify exact locations.

3' wide by 7' tall gate (optional)

2'-3'

2'-3'

2'-3'

2'-3'

10 cubic yard top and end loading container (6' L X 6' W X 7'-8" H.)

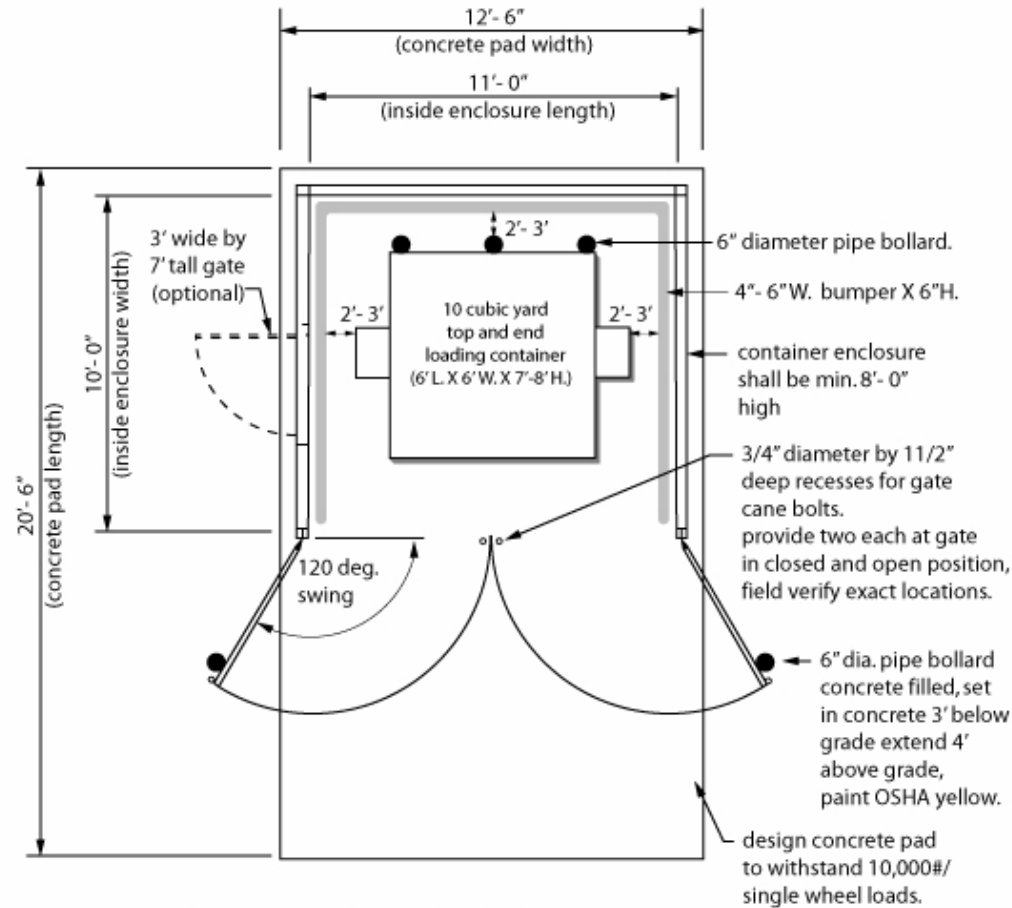
RECYCLABLES

90 deg. swing

design concrete pad to withstand 10,000#/single wheel loads.

This Container Enclosure Plan is for illustrative purposes only and may not conform to your local zoning or permitting requirements. When designing a waste enclosure for your facility, please check with your local county or municipal authorities for all ordinances and regulations governing such structures.

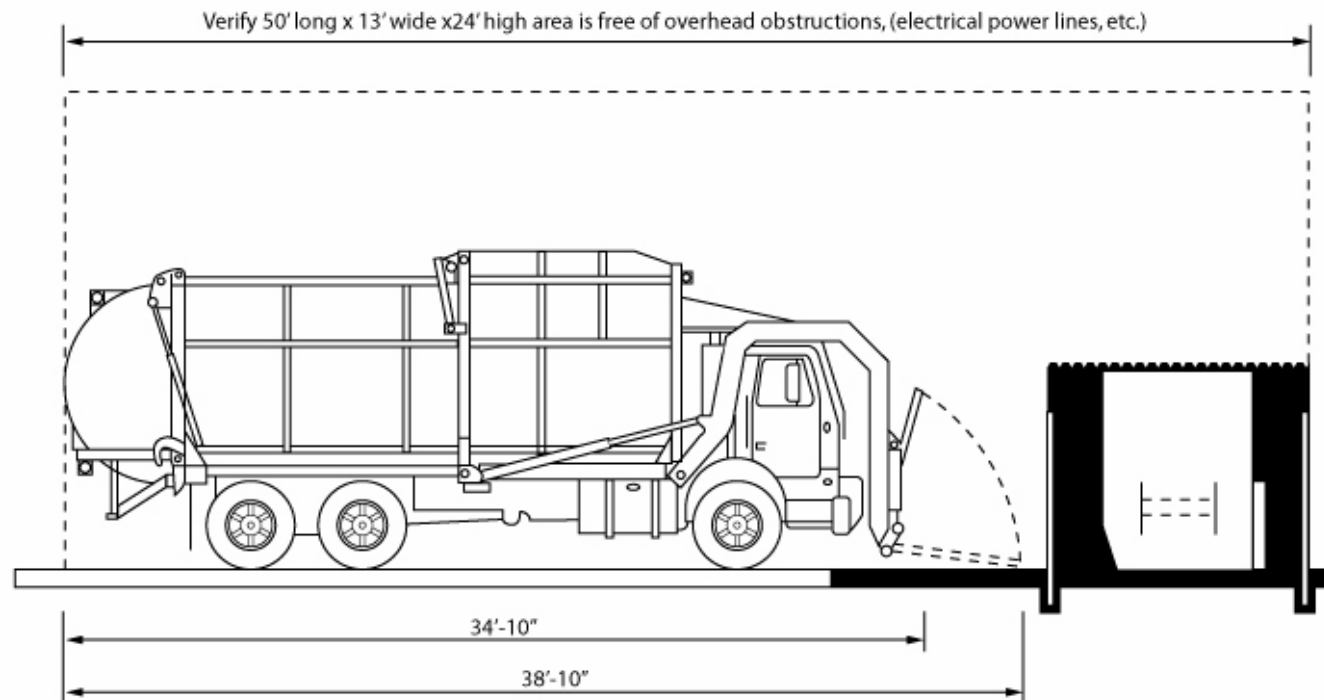
# Container Enclosure Illustration



CONTAINER ENCLOSURE PLAN

This Container Enclosure Plan is for illustrative purposes only and may not conform to your local zoning or permitting requirements. When designing a waste enclosure for your facility, please check with your local county or municipal authorities for all ordinances and regulations governing such structures.

# Container Enclosure Illustration



SIDE VIEW

NOTE: Vehicle shown is a standard 40 cu. yd. front end loading collection truck. Actual Dimensions will differ based on truck Manufacturer

# APPENDIX B

PRE-CONSTRUCTION DOCUMENTS

---

**APPLICATION FOR RIGHT OF WAY PERMIT**

**This is an application for a permit to use, occupy, construct, operate, maintain, and/or repair within a City of Dexter street right-of-way, including curb cuts and/or road cuts.**

Property Address: \_\_\_\_\_

Property Owner: \_\_\_\_\_

Property Owner email: \_\_\_\_\_ Mobile: \_\_\_\_\_

Applicant Name: \_\_\_\_\_ Phone: \_\_\_\_\_

Applicant Address: \_\_\_\_\_

Applicant email: \_\_\_\_\_

Activity type (i.e. operate, repair, construct/reconstruct, etc.): \_\_\_\_\_

Purpose (curb cuts, closures, etc): \_\_\_\_\_

Street(s): \_\_\_\_\_

Work Location: \_\_\_\_\_

**Note:** This permit does not relieve the applicant from complying with any and all requirements of law established by public bodies, governments, or agencies other than the City of Dexter.

**Inspection:** In all cases, the permit holder shall notify the Superintendent of Public Utilities or their designee as to the specific time of commencement so that, if necessary, a City inspector can be present while work is in progress.

**Costs:** The City of Dexter reserves the right to bill for any expenses associated with this permit, including outside inspector, engineering and planning costs. The City reserves the right to request a performance guarantee, unless this application is for an annual permit.

**Permit on Site:** The on-site foreman responsible for activities subject to the permit shall maintain a complete copy of the permit on the job site at all times.

**Contacts:**

City Office: 734-426-8303 (9:00am – 5:00pm)

Superintendent of Public Utilities, Water and Sewer Utilities: 734-426-4572 (7:00am – 3:30pm)

Utilities Emergency On-Call: 734-368-5212 (When Utilities Department is closed)

Department of Public Works: 734-426-8530 (7:00am – 3:30pm)

**As part of this application, the applicant(s) agree to comply fully with the following provisions and specifications:**

1. Applicant must pay fees per Street and Utility Right-of-Way Ordinance (17-2003).
2. Applicant shall provide written notice of the commencement of any activities pursuant to this application to the Dexter City Superintendent of Public Utilities or their designee, or his authorized designee, no less than three (3) working days prior to such commencement. Road closures require a detour plan and approval ten (10) working days prior to closure. All construction and/or maintenance operations or activities subject to this permit application must be completed on or before:
  - a. Date: \_\_\_\_\_.
3. All construction and/or maintenance operations or activities subject to this permit must be performed in a manner which fully complies with the City of Dexter's Street and Right-of-Way Ordinance and Design Specifications for site improvements as lawfully established.
4. The contractor must submit a Certificate of Insurance, which names the City of Dexter as an additional insured, in accordance with the City's Engineering Standards.
5. The applicant hereto agrees, along with any and all of his/her agents, representatives, employees, designees, or assignees, to hold harmless the City of Dexter, any and all of its agents, representatives, employees, designees, or assignees, from any and all claims of suits arising from or pertaining to any injuries, accidents, property damages, or loss of limb or life, resulting from or occurring during any and all operations or activities pursued subject to this permit application.
6. If required by the City of Dexter, as represented by its City Manager or their designee, the applicant hereto shall procure and maintain during the term of activities or operations specified herein, public liability and property damage insurance in such amounts as are specified in Section 1.70 of the City of Dexter Engineering Design Specifications for Site Improvements.
7. Applicant will be required to submit a performance guarantee escrow bond based on 50% of the total cost of construction acceptable as to form and substance to the Dexter City Manager or their designee; said bond shall be fully refundable upon performance of the conditions and specifications of the permit issued and in compliance with all applicable requirements of law. Applicant must provide justification for cost estimates.
  - a. Total Cost of Construction:\_\_\_\_\_

8. The following items must be attached to this application prior to permit issuance (please check if included):

Included

Location Map

Proof of Insurance

Performance Bond

Included

Specifications and Details

Engineering Plans

Other: \_\_\_\_\_

9. The Applicant understands that the permit herein applied for and all rights and privileges associated with and pertaining thereto can be withdrawn by the City of Dexter at any time following issuance in the event of material noncompliance of any of the specifications or provisions set forth herein.
10. Water and sewer inspections shall be done prior to backfill. It is the responsibility of the permit holder to notify the Public Utilities Department.
11. Sidewalk and driveway approaches required 3 inspections; Form, sub-grade and final. It's the responsibility of the permit holder to schedule inspections with the Department of Public Utilities.
12. The City of Dexter is not responsible for damage done to irrigation systems placed within the Public Rights-of-Ways.
13. Residential Driveways – New and Existing \$25.00; Commercial Driveways – New and Existing \$60.00; Minor Maintenance, including streetlights: Any work on a street right-of-way including repairs on existing sewer and water leads for residential properties including all above and belowground utilities, minor work within the street right-of-way, such as repairing a residential gas lead or electrical service lead, etc. \$100.00; Bore, Jack and Tunnel – Applies to all utilities, including sewer and water leads, for new residential properties \$200.00; Pavement Cutting for any purpose – All utilities, including sewer and water leads, for new and existing residential properties. \$400.00; Major Maintenance – Including new construction and repair of existing underground utilities, such as gas mains, fiber optics, electrical supply lines, and telephone, not pertaining to residential service leads, etc. \$500.00; Annual Blanket Utility Right- of-Way Work Permit \$3000.00
14. The applicant shall inform area residents and businesses at least 48-hours prior to commencement of work. Additional information, including the anticipated time and length of construction, any proposed traffic disruptions, and contact information for the responsible party shall be provided.

---

Applicant's Signature

Date

**Staff Review**

Project \_\_\_\_\_ Date Received: \_\_\_\_\_

Fee: \$ \_\_\_\_\_ Receipt # \_\_\_\_\_

Attachments

Included

Location Map

Proof of Insurance

Performance Bond

Included

Specifications and Details

Engineering Plans

Other

☐

**Approved**

☐

**Denied**

Permit # \_\_\_\_\_ Date Issued: \_\_\_\_\_

ADDITIONAL CONDITIONS (IF ANY): \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

REASONS FOR DENIAL (IF APPLICABLE): \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

A PERMIT, AS REQUESTED IN THE FOREGOING APPLICATION AND SUBJECT TO THE TERMS AND CONDITIONS HEREIN, IS HEREBY GRANTED FOR THE FOLLOWING PERIOD:

From: \_\_\_\_\_ To: \_\_\_\_\_

\_\_\_\_\_  
Superintendent of Public Utilities

\_\_\_\_\_  
Date

\_\_\_\_\_  
City Manager

\_\_\_\_\_  
Date

APPROVAL STAMP:

### Inspection Fee Worksheet (Based on Typical Construction Production Rates)

The following production rates are to be used in determining the estimated number of days to complete the project. A rate of \$925/day will then be applied to the total number of days to determine the inspection escrow. One day is equal to eight hours of inspection.

#### STORM WATER MANAGEMENT SYSTEM

Underdrain	400 lft/day
12" to 18" Storm Sewer	200 lft/day
21" and 24" Storm Sewer	175 lft/day
30" and larger Storm Sewer	150 lft/day
2' dia. Inlet	5 inlets/day
4' dia to 6' dia Catch Basin/Manhole	3 structures/day
Outlet Control Structure	2 structures/day
End sections	5 end sections/day
Detention Pond/Forebay/Misc Grading	2 days
Storm - Punch List and Reinspection	2 days

#### SANITARY SEWER

Sanitary Sewer	200 lft/day
Sanitary Lead	250 lft/day
Sanitary Structure	3 structures/day
Sanitary Air Test	0.3 day
Sanitary - Punch List and Reinspection	0.3 day

#### WATER SUPPLY SYSTEM

Water Main	200 lft/day
Water Service	300 lft/day
Tapping Sleeve, Gate Valve in Well	1/day
Gate Valve in Well	3 gate valves/day
Gate Valve in Box	5 gate valves/day
Shut-off in box	6 shut-offs/day
Fire Hydrant Assembly	4 hydrants/day
Water Supply - Pressure Test	1 day
Water Supply - Bacteriological Test	1 day
Water Supply - Punch List and Reinspection	2 days

#### MISCELLANEOUS

The following time allocations are what is expected for an average size development. These may change depending on the size of the project.

Preconstruction Meeting and Coordination	1 day
Sidewalk Form Check and Final Check	1 day
Paving Spot Check	0.5 day
Substantial Completion Inspection and Punch List	1 day
Final Inspection	0.5 day
Record Plan Request and Processing	0.5 day
Record Plan Review per Submittal	0.5 day/plan sheet
Project Administration	1 day

#### ESCROW BREAKDOWN (\$925/DAY)

\_\_\_\_\_ Total Proposed Days @ \$925/day = \_\_\_\_\_ for Inspection Escrow

**City of Dexter**

**PRE-CONSTRUCTION MEETING SIGN IN SHEET**

**Project:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**OHM Advisors Project No:** \_\_\_\_\_

*Please print the following information and provide a business card to the OHM representative.*

NAME	COMPANY	PHONE	FAX or Email

**Note: Contact OHM Advisors Construction Department at 734-466-4539, Monday through Friday 8 am – 4 pm to schedule inspection at least 3 working days prior to start of construction, or send a fax request to 734-522-6427, attn. Construction Department. All persons listed above will receive a copy of this information packet via fax.**

**Please include the Project Name and OHM Advisors Project Number on all correspondence.**

## CONSTRUCTION CONTACT INFORMATION

**Project Name:** \_\_\_\_\_

**Location (include section #):** \_\_\_\_\_ **Project Supervisor:** \_\_\_\_\_

**OHM Advisors Project No.:** \_\_\_\_\_ **Municipality Project No.:** \_\_\_\_\_

<b>Developer/Owner</b> Street Address City, State & Zip Contact Person:	Phone: Fax: Email: Emergency:

*(If a different professional engineer/professional surveyor is going to complete the record drawings, please list them here)*

<b>Design Engineer</b> Street Address City, State & Zip Contact Person:	Phone: Fax: Email: Emergency:

<b>Prime Contractor</b> Street Address City, State & Zip Contact Person: Safety Officer:	Phone: Fax: Email: Emergency:

## CONSTRUCTION CONTACT INFORMATION *continued*

<b>Mass grading/soil</b>		Phone:	
Street Address		Fax:	
City, State & Zip		Email:	
Contact Person:		Emergency:	
<b>Underground</b>		Phone:	
Street Address		Fax:	
City, State & Zip		Email:	
Contact Person:		Emergency:	
<b>Paving</b>		Phone:	
Street Address		Fax:	
City, State & Zip		Email:	
Contact Person:		Emergency:	
<b>Landscape</b>		Phone:	
Street Address		Fax:	
City, State & Zip		Email:	
Contact Person:		Emergency:	
<b>Other: Concrete</b>		Phone:	
Street Address		Fax:	
City, State & Zip		Email:	
Contact Person:		Emergency:	

*After the pre-construction meeting, please fax this completed sheet to the OHM Advisors Construction Department at 734-522-6427.*

***PRIOR TO THE START OF CONSTRUCTION:***

Mark N/A if the item is not applicable to this project.

Check below if an issue is present and either write the issue or reference an attachment.

<input type="checkbox"/>	Electricity:	_____
		_____
<input type="checkbox"/>	Natural Gas:	_____
		_____
<input type="checkbox"/>	Telephone:	_____
		_____
<input type="checkbox"/>	Cable TV:	_____
		_____
<input type="checkbox"/>	Other:	_____
		_____

The following should address any other Municipality concerns, including other possible interested parties:

<input type="checkbox"/>	City of Dexter:	_____
		_____
<input type="checkbox"/>	Adjacent Municipality:	_____
		_____
<input type="checkbox"/>	Road Commission:	_____
		_____
<input type="checkbox"/>	Drain Commission:	_____
		_____
<input type="checkbox"/>	MDOT:	_____
		_____
<input type="checkbox"/>	Railroad:	_____
		_____
<input type="checkbox"/>	County:	_____
		_____
<input type="checkbox"/>	Residential:	_____
		_____
<input type="checkbox"/>	Community Development Agency:	_____
		_____

***PRIOR TO THE START OF CONSTRUCTION continued:***

☐ Other: \_\_\_\_\_

The following checked items must be submitted to the City and OHM Advisors:

**PERMITS:** Copies of permits may be faxed to the OHM Advisors Construction Department at 734-522-6427.

☐ Soil Erosion – Washtenaw County  
Permit # \_\_\_\_\_ Expiration Date: \_\_\_\_\_

☐ NPDES (National Pollution Discharge Elimination System - MDEQ)  
Permit # \_\_\_\_\_ Expiration Date: \_\_\_\_\_

☐ Water Main (Michigan Department of Environmental Quality)  
Permit # \_\_\_\_\_ Expiration Date: \_\_\_\_\_

☐ Sanitary Sewer (Michigan Department of Environmental Quality)  
Permit # \_\_\_\_\_ Expiration Date: \_\_\_\_\_

☐ Storm Sewer (MDEQ or Washtenaw County Drain Commission)  
Permit # \_\_\_\_\_ Expiration Date: \_\_\_\_\_

☐ Right of Way (City of Dexter)  
Permit # \_\_\_\_\_ Expiration Date: \_\_\_\_\_

☐ Wetland/Floodplain: (Michigan Department of Environmental Quality)  
Permit # \_\_\_\_\_ Expiration Date: \_\_\_\_\_

☐ Other: \_\_\_\_\_ (agency: \_\_\_\_\_)  
Permit # \_\_\_\_\_ Expiration Date: \_\_\_\_\_

☐ A Performance Guarantee of \$ \_\_\_\_\_ must be posted with City of Dexter.

☐ Construction Escrow in the amount of \$ \_\_\_\_\_ must be paid to City of Dexter. Send a copy of the paid escrow receipt to OHM, Attn. Marilyn Vaillancourt. Prior to any utility testing, the remaining escrow amount will be reviewed to verify that there is enough escrow to complete the project.

☐ Soil Erosion Escrow in the amount of \$ \_\_\_\_\_ must be paid to Washtenaw County.

☐ Owner's and Contractor's Protective Public Liability and Property Damage Insurance shall include the following additional named insured:

1. City of Dexter and related agency entities
2. OHM Advisors its employees, agents
3. Any other entities impacted

***PRIOR TO THE START OF CONSTRUCTION continued:***

- ☐ Proof of Prime Contractor's general liability insurance (project name appearing in description area) shall name as additionally insured and be submitted to the City and OHM Advisors Standard language regarding cancellation will be upgraded to "30 days written notice" for cancellation and the language "failure to do so shall impose no obligation or liability of any kind upon the insurer, its agents or representatives." will be removed or crossed off.
- ☐ **SCHEDULE:** Please provide a schedule of work including the anticipation of duration for major elements such as: mass grading, water main installation, sanitary installation, storm installation, lead installations, paving activities, and landscape restoration. Fax to OHM Advisors Construction Department at 734-522-6427.
- ☐ **PRE-CONSTRUCTION VIDEO TAPING:** If this section is checked, this project requires the work site to be videotaped prior to the start of construction. Copies of the video are to be mailed to OHM Construction Department, Attn. Site Coordinator.
- ☐ **TYPE OF MATERIALS:** Please list the type and class of the materials to be used for this project and provide a copy of the testing orders (suppliers and materials) to the inspector on site.

***PRIOR TO THE START OF CONSTRUCTION continued:***

- ☐ Sand \_\_\_\_\_
- ☐ Aggregate \_\_\_\_\_
- ☐ Bituminous \_\_\_\_\_
- ☐ Concrete \_\_\_\_\_
- ☐ Sanitary Sewer \_\_\_\_\_
- ☐ Water Main \_\_\_\_\_
- ☐ Storm Sewer \_\_\_\_\_
- ☐ Manholes \_\_\_\_\_
- ☐ Hydrants \_\_\_\_\_
- ☐ Brass/Fittings: \_\_\_\_\_
- ☐ Castings \_\_\_\_\_
- ☐ Signs \_\_\_\_\_
- ☐ Posts \_\_\_\_\_

☐ Contractor shall provide material certifications to the inspector for any of the above applicable items and any other related items used in the site construction work.

☐ Excess material should be legally disposed of off-site. Contact the City before transporting any material to other sites (including residential) within the municipality. Local ordinances may require prior approval. Make sure not to dispose materials in areas that may impact a watershed.

☐

At the request of the City of Dexter, inspection is required for the following: water main, sanitary sewer, storm sewer, retaining walls, public paving, private paving, restoration, landscaping, and \_\_\_\_\_.

☐

Three (3) working days notice is required (not including weekends/holidays) to schedule inspection. Applies to construction start and any time that work is suspended for two days or more, contact OHM Construction Department at 734-466-4539, Mondays through Fridays 8 am to 4 pm. Contractor is advised that utilities installed on the project without inspection will be rejected by the City.

☐

Utilities must be staked and dated cut sheets given to inspector before construction may start. This includes water, sanitary, storm and road (where applicable). Fax cut sheets to the OHM Construction Department at 734-522-6427.

***PRIOR TO THE START OF CONSTRUCTION continued:***

- ☐ When OHM is to do the staking, a staking request form must be filled out with a minimum of three (3) working days notice and faxed to 734-522-6427, attention to: Survey Department.
- ☐ Notify MISS DIG (800-482-7171) at least three (3) full working days in advance. Keep your reference number for complaints on improperly staked utilities or if no staking was done.
- ☐ Density testing will be performed by an independent testing company and not by OHM. The Owner / Developer is responsible for arranging this service as well as the cost for this service. **Fax one (1) copy of all test reports for backfill and pavement construction to Chris Donajkowski at OHM.**
- ☐ OHM will perform the density testing. Contact the Project Supervisor for arranging this service.
- ☐ Any field problems or design changes shall be directed to the Developer's Engineer for re-design then submitted to OHM for approval. All changes must be reviewed, approved and distributed before construction will be allowed. Note the revision number and date on all plans. **The APPROVED plans are dated.**
- ☐ Any water used on site, originating from a public fire hydrant or water source, will be charged by the City of Dexter at a flat rate. A backflow-preventer must be provided by the contractor.
- ☐ Public and private streets must be maintained in a clean condition and free of debris at all times. In the event that a public roadway becomes dirty, the Contractor shall clean it immediately. The question of the cleanliness of roads and streets will be determined solely by the Municipal road agency or its authorized representative.
- ☐ It is the Owner / Contractor's responsibility to comply with all current City of Dexter Engineering Standards and Design Specifications, and the approved plans for the project, regardless of whether any deficiency is noted at the time of construction or preliminary walkthrough.
- ☐ It is the Contractor's responsibility to comply with all current MIOSHA/OSHA standards where applicable including confined space regulations for new construction. Attendance at the pre-construction meeting by the Contractor's representative acknowledges understanding of this obligation. The City and its Engineering Consultant, OHM, will not oversee the Contractor's operations from the stand point of safety and are not obligated to act as the Contractor or Subcontractor's safety officer.
- ☐ Traffic control must be in compliance with the Michigan Manual of Uniform Traffic Control Devices in conjunction with local construction permit requirements or stipulations and any detour, staging or traffic control diagrams incorporated into approved plans.

☐ **WATER MAIN**

- ☐ Water main shall be constructed per City of Dexter Standard Water Main Details. Where conflicts occur between the general plans and the standard details, the conditions in the standard details shall govern.
- ☐ Refer to City of Dexter Water Main Standards for current material requirements.

Gate Valves in Dexter OPEN LEFT (standard black valve operator nut).

Water main to be installed with Polyethylene encasement (Poly-wrap) as directed by the City Engineer.

Water main to be cleaned with Poly-pig as directed by the City Engineer. Coordinate location(s) of Poly-pig(s) with City Engineer prior to starting water main construction.

***PRIOR TO THE START OF CONSTRUCTION continued:***

Thrust blocks are not permitted except behind tapping valves (both inside and outside the precast gatewell), and behind fire hydrants. All other joint restraint to be provided by mechanical joint retainer glands (i.e. Mega-Lug), and/ or locking gaskets.

- ☐ Pressure testing will be conducted by the Contractor and witnessed by OHM on behalf of the City. Water main testing shall be per AWWA Standards. Notify OHM (Site Coordinator) of schedule (3 working days prior to test). Prior to any utility testing, the remaining escrow amount will be reviewed to verify that there is enough escrow to complete the project.
- ☐ No bacterial tests will be performed until pressure tests have been passed. Bacteria samples (two consecutive days) will be obtained by the OHM Inspector, with the Contractor present. Hard copy results must be on file at OHM prior to any tie-in.
- ☐ No water main tie-ins are allowed until bacteria and pressure tests have been passed. When a tie-in does occur, all flushing of the main will have been stopped, all apparatus disconnected, and all valves opened.

☐ **SANITARY SEWER**

- ☐ Sanitary sewer shall be constructed per City of Dexter Standard Sanitary Sewer Details. Where conflicts occur between the general plans and the standard details, the conditions in the standard details shall govern.
- ☐ Sanitary taps into existing structures will be inspected by OHM. Taps into existing structures shall be neatly core-drilled and a rubber boot shall be used for the new pipe.
- ☐ Sanitary sewer invert elevations will be recorded by the inspector and the contractor at each structure. Sanitary sewer main that is found to be laid at less than minimum-specified grade, or with backflow, will not be accepted by the City.
- ☐ Air Testing will be conducted by the contractor and witnessed by OHM on behalf of the City. Contact OHM (Site Coordinator) to set up test date. Prior to any utility testing, the remaining escrow amount will be reviewed to verify that there is enough escrow to complete the project.
- ☐ An infiltration, exfiltration, or nine-point deflection test using a mandrel is required.
- ☐ Videotaping of the sanitary sewer is to be performed no sooner than 30 days after completion of backfill and a copy of the tape must be on file with OHM prior to acceptance.

☐

**PAY ESTIMATES** (contract administration projects)

☐

Pay estimates are processed once a month. The deadlines for submittals are based on the City of Dexter's meeting schedule for approval. Contact OHM Construction Department at 734-5226711 for further details.

☐

Contractor must submit Contractor's Declaration and an itemized invoice for each payment. Contractor's Affidavit, Full Unconditional Lien Waivers from all subcontractors and suppliers, County Permit release and surety release must be submitted before final payment can be issued.

***PRIOR TO FINAL ACCEPTANCE OF PROJECT***

☐

OHM will conduct a Preliminary Walkthrough of the site after all public utility installation is complete, and after at least the leveling course of asphalt pavement is complete. A Preliminary Utility Punchlist will be generated from this walkthrough. Once the items on the Preliminary Utility Punchlist have been completed, OHM will issue a letter to the City recommending the public utilities on the project are substantially complete. **ALL MAINTENANCE AND OPERATION OF THE PUBLIC UTILITIY IMPROVEMENTS ON THE PROJECT WILL REMAIN THE RESPONSIBILITY OF THE DEVELOPER / CONTRACTOR DURING THE TIME PERIOD FROM SUBSTANTIAL COMPLETION TO FINAL ACCEPTANCE.** OHM, Inc. will only recommend Final Acceptance of the project upon satisfactory completion of all Close-out items, including but not necessarily limited to, Record Drawings, Easements, Maintenance and Guarantee Bond, and Final Utility Inspection.

☐

OHM will conduct a Final Walkthrough of the site after all construction on the project is complete. This includes all buildings, landscaping, and wearing course of asphalt pavement. A Final Utility Punchlist will be generated from this walkthrough. All items on the Final Utility Punchlist must be completed prior to Final Acceptance of the project.

**ITEMS REQUIRED FOR RECOMMENDATIO OF PROJECT CLOSEOUT**

☐

**As-builts:** reviewed and approved

☐

**Grading certificate:** signed and sealed

☐

**Easements Required:**

☐

Water Main

☐

Sanitary Sewer

☐

Ingress/Egress

☐

Storm Sewer

☐

Safety Path

☐

Other \_\_\_\_\_

A maintenance and guarantee bond for   % of applicable Public Works based on the engineer's estimate of \$            for a duration of 2 years shall be submitted to OHM/Municipality once all punch list items have been addressed. The amount required for this project is \$                                 .

☐

**ADDITIONAL NOTES:**

[illegible]

# APPENDIX D

## SAMPLE EASEMENTS AND AGREEMENTS

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WATER MAIN EASEMENT

KNOW ALL MEN BY THESE PRESENTS, that \_\_\_\_\_, whose address is \_\_\_\_\_, (hereinafter referred to as “Grantor”), being title holder to the following described parcel of land, to wit:

Description of Parcel: (Include address of parcel)

Tax Identification Number: \_\_\_\_\_

for and in consideration of One (\$1.00) Dollar, receipt of which is hereby acknowledged, does hereby grant and convey to the \_\_\_\_\_, a Michigan Municipal Corporation, whose address is \_\_\_\_\_, (hereinafter referred to as “Grantee”), a perpetual easement for a water main, over, upon, across, in, through, and under the following described real property to wit:

Easement Description

and to enter upon sufficient land adjacent to said water main easement for the purpose of exercising the rights and privileges granted herein.

Grantee may install, repair, replace and maintain water main lines, and all necessary appurtenances thereto, within the easement herein granted.

Grantee will not be responsible for replacing pavement, trees or any other physical objects within the easement herein granted.

Grantor agrees not to build or to convey to others permission to build any permanent structures on the above-described easement.

The premises so disturbed by reason of the exercise of any of the foregoing powers, rights and privileges, shall be reasonably restored to its prior condition by Grantee.

This instrument shall be binding upon and inure to the benefit of the parties hereto, their heirs, representatives, successors and assigns.

IN WITNESS WHEREOF, the undersigned Grantor(s) has affixed

signature (s) this \_\_\_\_\_ day of \_\_\_\_\_ A.D., 20\_\_\_\_\_.

CORPORATION: \_\_\_\_\_  
Name

By: \_\_\_\_\_  
Signature

Its: \_\_\_\_\_  
Printed Name & Title

By: \_\_\_\_\_  
Signature

Its: \_\_\_\_\_  
Printed Name & Title

STATE OF MICHIGAN        )  
  )SS  
COUNTY OF                 )

On this \_\_\_\_\_ day of \_\_\_\_\_ A.D., 20\_\_\_\_, before me, a Notary Public in and for said  
County, appeared \_\_\_\_\_ and \_\_\_\_\_  
to me known personally known, who, being by me duly sworn, did each for himself say that they are  
respectively the \_\_\_\_\_ and \_\_\_\_\_ of  
\_\_\_\_\_ the corporation named in and which executed the within  
instrument, and that the seal affixed to said instrument was signed and sealed in behalf of said corporation  
by authority of its board of directors; and acknowledged said instrument to be the free act and deed of said  
corporation.

\_\_\_\_\_  
Notary Public, \_\_\_\_\_ County, MI  
My commission expires \_\_\_\_\_

This instrument drafted by:

Tax Identification Number: \_\_\_\_\_

WHEN RECORDED RETURN A COPY TO:  
City of Dexter  
Attn: City Manager  
8140 Main St  
Dexter, MI 48130

OHM Advisors  
34000 Plymouth Road  
LIVONIA, MI 48150

SANITARY EASEMENT

KNOW ALL MEN BY THESE PRESENTS, that \_\_\_\_\_, whose address is \_\_\_\_\_, (hereinafter referred to as “Grantor”), being title holder to the following described parcel of land, to wit:

Description of Parcel: (Include address of parcel)

Tax Identification Number:\_\_\_\_\_

for and in consideration of One (\$1.00) Dollar, receipt of which is hereby acknowledged, does hereby grant and convey to the \_\_\_\_\_, a Michigan Municipal Corporation, whose address is \_\_\_\_\_, (hereinafter referred to as “Grantee”), a perpetual easement for a sanitary sewer, over, upon, across, in, through, and under the following described real property to wit:

Easement Description

and to enter upon sufficient land adjacent to said sanitary easement for the purpose of exercising the rights and privileges granted herein.

Grantee may install, repair, replace and maintain sanitary lines, and all necessary appurtenances thereto, within the easement herein granted.

Grantee will not be responsible for replacing pavement, trees or any other physical objects within the easement herein granted.

Grantor agrees not to build or to convey to others permission to build any permanent structures on the above-described easement.

The premises so disturbed by reason of the exercise of any of the foregoing powers, rights and privileges, shall be reasonably restored to its prior condition by Grantee.

This instrument shall be binding upon and inure to the benefit of the parties hereto, their heirs, representatives, successors and assigns.

IN WITNESS WHEREOF, the undersigned Grantor(s) has affixed  
signature (s) this \_\_\_\_\_ day of \_\_\_\_\_ A.D., 20

CORPORATION: \_\_\_\_\_  
Name

By: \_\_\_\_\_  
Signature

Its: \_\_\_\_\_  
Printed Name & Title

By: \_\_\_\_\_  
Signature

Its: \_\_\_\_\_  
Printed Name & Title

STATE OF MICHIGAN        )  
  )SS  
COUNTY OF                )

On this \_\_\_\_\_ day of \_\_\_\_\_ A.D., 20\_\_\_\_, before me, a Notary Public in and for said  
County, appeared \_\_\_\_\_ and \_\_\_\_\_  
to me known personally known, who, being by me duly sworn, did each for himself say that they are  
respectively the \_\_\_\_\_ and \_\_\_\_\_ of  
\_\_\_\_\_ the corporation named in and which executed the within  
instrument, and that the seal affixed to said instrument was signed and sealed in behalf of said corporation  
by authority of its board of directors; and acknowledged said instrument to be the free act and deed of said  
corporation.

\_\_\_\_\_  
Notary Public, \_\_\_\_\_ County, MI  
My commission expires \_\_\_\_\_  
This instrument drafted by:

Tax Identification Number: \_\_\_\_\_

WHEN RECORDED RETURN A COPY TO:  
City of Dexter  
Attn: City Manager  
8140 Main St  
Dexter, MI 48130

OHM Advisors  
34000 Plymouth Road  
LIVONIA, MI 48150

ACCESS EASEMENT

KNOW ALL MEN BY THESE PRESENTS, that \_\_\_\_\_,  
whose address is \_\_\_\_\_, (hereinafter referred to as  
“Grantor”), being title holder to the following described parcel of land, to wit:

Description of Parcel: (Include address of parcel)

Tax Identification Number: \_\_\_\_\_

for and in consideration of One (\$1.00) Dollar, receipt of which is hereby acknowledged, does hereby  
grant and convey to the \_\_\_\_\_, a Michigan Municipal  
Corporation, whose address is \_\_\_\_\_,  
(hereinafter referred to as “Grantee”), a perpetual easement for an access easement, over, upon, across, in,  
through, and under the following described real property to wit:

Easement Description

and to enter upon sufficient land adjacent to said access easement for the purpose of exercising the rights  
and privileges granted herein.

Grantee may install, repair, replace and maintain access easement and all necessary appurtenances  
thereto, within the easement herein granted.

Grantor agrees not to build or to convey to others permission to build any permanent structures on  
the above-described easement.

The premises so disturbed by reason of the exercise of any of the foregoing powers, rights and  
privileges, shall be reasonably restored to its prior condition by Grantee.

The Grantee shall indemnify and hold harmless the Grantor from any and all liability for personal  
property damage and/or any and all damages and/or injuries resulting from the Grantee’s construction, use,  
maintenance and/or repair of the access easement, except any injuries and/or damages caused by the  
negligence of the Grantor.

This instrument and the rights and obligations contained herein shall run with the land described  
herein and shall be binding upon and inure to the benefit of the parties hereto, their heirs, representatives,  
successors and assigns.

IN WITNESS WHEREOF, the undersigned Grantor(s) has affixed  
signature (s) this \_\_\_\_\_ day of \_\_\_\_\_ A.D., 20\_\_\_\_.

CORPORATION: \_\_\_\_\_  
Name

By: \_\_\_\_\_  
Signature

Its: \_\_\_\_\_  
Printed Name & Title

By: \_\_\_\_\_  
Signature

Its: \_\_\_\_\_  
Printed Name & Title

STATE OF MICHIGAN        )  
  )SS  
COUNTY OF                )

On this \_\_\_\_\_ day of \_\_\_\_\_ A.D., 20\_\_\_\_, before me, a Notary Public in and for said  
County, appeared \_\_\_\_\_ and \_\_\_\_\_  
to me known personally known, who, being by me duly sworn, did each for himself say that they are  
respectively the \_\_\_\_\_ and \_\_\_\_\_ of  
\_\_\_\_\_ the corporation named in and which executed the within  
instrument, and that the seal affixed to said instrument was signed and sealed in behalf of said corporation  
by authority of its board of directors; and acknowledged said instrument to be the free act and deed of said  
corporation.

\_\_\_\_\_  
Notary Public, \_\_\_\_\_ County, MI  
My commission expires \_\_\_\_\_  
This instrument drafted by:

Tax Identification Number: \_\_\_\_\_

WHEN RECORDED RETURN A COPY TO:  
City of Dexter  
Attn: City Manger  
8140 Main St  
Dexter, MI 48130

OHM Advisors  
34000 Plymouth Road  
LIVONIA, MI 48150

## MAINTENANCE AND GUARANTEE BOND

Bond No. \_\_\_\_\_

KNOW ALL PERSONS BY THESE PRESENTS, That \_\_\_\_\_

as Principal, and \_\_\_\_\_

as Surety, are held and firmly bound unto the City of Dexter, a Michigan Municipal Corporation, whose address is 8140 Main Street, Dexter, Michigan 48130, the sum of

\_\_\_\_\_ Dollars (\$ \_\_\_\_\_) good and lawful money of the United States of America, to be paid to the City of Dexter, its legal representatives and assigns, for which payment well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, and each and every one of them jointly and severally, firmly by these presents.

Sealed with our seals and dated this \_\_\_\_\_ day of \_\_\_\_\_ A.D. 20\_\_\_\_\_.

WHEREAS, the above named Principal has entered into a certain written contract with

dated this \_\_\_\_\_ day of \_\_\_\_\_, A.D. 20 \_\_\_\_, wherein the said Principal  
covenanted and agreed as follows, to-wit:

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION It is SUCH, that and the above named Principal has agreed with the City of Dexter that for a period of 2 years from date of above projects acceptance by the City, to keep in good order and repair any defect in all work done under said contract either by the Principal or his or her sub-contractors, or their material suppliers, that may develop during said period due to improper materials, defective equipment, workmanship or arrangements, and any other work affected in making good such imperfections, shall also be made good all without expense to the City, and that whenever directed to do so

by the City of Dexter by notice served in writing, either personally or by mail, on the Principal at \_\_\_\_\_

\_\_\_\_\_ or legal representatives,  
or successors, or on the Surety at \_\_\_\_\_

WILL PROCEED at once to make such repairs as directed by the City; and in case of failure so to do within one week from the date of service of such notice, or within reasonable time not less than one week, as shall be fixed in said notice, then the City of Dexter shall have the right to purchase such materials and employ such labor and equipment as may be necessary for the purpose, and to undertake, do and make such repairs and charge the expense thereof to, and receive same from, said Principal or Surety. If any repair is necessary to be made at once to

protect life and property, then and in that case, the City of Dexter may take immediate steps to repair or barricade such defects without notice to the contractor. In such accounting the City of Dexter shall not be held to obtain the lowest figures for the doing of the work, or any part thereof, but all sums actually paid therefore shall be charged to the Principal or Surety. In this connection the judgment of the City of Dexter is final and conclusive. If the said Principal for a period of 2 years from the date of acceptance by the City of Dexter, shall keep said work so constructed under said contract in good order and repair, excepting only such part or parts of said work which may have been disturbed without the consent or approval of said Principal after final acceptance of same, and shall whenever notice is given as hereinbefore specified, at once proceed to make repair as in said notice directed, or shall reimburse the City of Dexter for any expense incurred by making such repairs, should the Principal or Surety fail to do as hereinbefore specified, and shall fully indemnify, defend and save harmless the said Principal and OHM Advisors from all suits and actions for damages of every name and description brought or claimed against it for, or on account of, any injury or damage to person or property received or sustained by any party or parties, by or from any of the acts or omissions or through the negligence of said Principal, servants, agents or employees, in the prosecution of the work included in said contract, and from any and all claims arising under the Workman's Compensation Act, so-called, of the State of Michigan, then the above obligation shall be void, otherwise to remain in full force and effect.

IN WITNESS WHEREOF, the parties hereto have caused this instrument to be executed by their respective authorized officers this \_\_\_\_\_ day of \_\_\_\_\_ A.D., 20\_\_\_\_.

Signed, Sealed and Delivered in  
the Presence of:

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CITY OF DEXTER

AGREEMENT FOR STORM WATER DETENTION  
AND DISCHARGE RESTRICTION SYSTEM

THIS AGREEMENT is made this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, by and between \_\_\_\_\_,  
whose address is \_\_\_\_\_,  
(hereinafter "Owner"), and the City of Dexter, a Municipal Corporation organized and existing under the  
laws of the State of Michigan, whose address is 8140 Main Street, Dexter, Michigan, (hereinafter "City").

WITNESSETH:

WHEREAS, Owner owns certain real property located in the City of Dexter, Washtenaw County,  
Michigan, as more particularly described in Exhibit "A", the approved final site plan, attached hereto and  
made a part hereof, on which the Owner intends to develop \_\_\_\_\_.

Whereas, Owner has received all necessary site approvals for said development from the City, and  
now seeks to obtain approval of the construction plans from the City and

WHEREAS, to facilitate approval of the final construction plans, the City and Owner wish to enter  
into an Agreement for the benefit of said property regarding the construction and maintenance of a storm  
water retention and discharge system (part of the surface water drainage system necessary to facilitate this  
development, as indicated on the plan of grading and storm drainage) on the real property particularly  
described in Exhibit "B", the legal description of the subject property, attached hereto and made a part hereof  
(such property and improvements hereinafter referred to collectively as "Detention System").

NOW, THEREFORE, in consideration of the foregoing and of the final approval of the construction  
plans by City of Dexter and of the mutual covenants contained herein, and parties hereto agree as follows:

1. Owner shall construct and continually maintain the Detention System on the real property  
described in Exhibit "B", in accordance with plans previously submitted to and approved by the City  
and in compliance with all applicable state and local laws, which system shall be utilized for  
drainage and/or water retention as approved by the City. Reference is made to the plans for (type of  
detention) \_\_\_\_\_, prepared  
by \_\_\_\_\_ and dated  
and approved by the City of Dexter Department of Public Works.
2. All landscaping, planting or other items on the entire site, Exhibit "A", shall be placed and  
continually maintained so as not to interfere, impede, or obstruct the flow of water and/or the  
purpose of the said system.
3. Owner hereby conveys to the City an easement over, on and in the property described in Exhibit  
"B", attached hereto and made a part hereof, which easement shall be for the purpose of access to the  
Detention and Discharge System for the maintenance, renovation, and repair thereof should the  
Owner fail to properly maintain same after notice to do so from the City.

4. In the event that the Owner shall at any time fail to maintain the Detention and Discharge System in reasonable order and condition, the City may serve written notice upon the Owner at the address as shown on the City tax rolls setting forth the manner in which the Owner has failed to maintain the Detention and Discharge System in reasonable condition and said notice shall include a demand that deficiencies of maintenance be cured within a reasonable time as stated therein. If the deficiencies set forth in the original notice or in the modifications thereof shall not be cured within said time limits of any extension thereof, the City, in order to preserve the taxable values of the subject property and to prevent the Detention and Discharge System for becoming a public or private nuisance, may enter upon said System and may repair and maintain the same. Said repair and maintenance by the City shall not constitute a taking of the said System nor vest in the public any right to use the same. The cost of such repair and/or maintenance by the City, including reasonable administrative costs, shall be assessed against the property described on Exhibit "A" on the same basis as City taxes are assessed, and shall become a lien on said property. Said costs may be collected in the same manner as City taxes are collected. The City at the time of entering upon said Detention and Discharge System for the purpose of repair and/or maintenance may file a notice of lien in the office of the Register of Deeds of the County of Washtenaw upon the property affected by the lien. If said costs are not paid by the Owner, the City may pursue the collection of same through appropriate court actions and in such case the Owner shall pay in addition to said costs all costs of litigation, including attorney fees.

5. Owner agrees that this Agreement shall be recorded and that the land described on Exhibit "A" shall be subject to the covenants and obligations contained herein, and the covenants and obligations shall inure to the benefit of and be enforceable by the City, or the owner and/or their respective legal representatives, heirs, successors, and assigns.

6. Invalidation of any one of these covenants and restrictions by judgment or court order shall in no way affect the validity of any other provisions, which shall remain in full force and effect.

7. The parties whose signatures appear below, hereby represent and warrant that they have the authority and capacity to sign this agreement and bind the respective parties hereto.

IN WITNESS WHEREOF, the parties hereto have set their hands and seals at the City of Dexter, Washtenaw County, Michigan, on the date above written.

Witnesses by:

Owner

\_\_\_\_\_ By: \_\_\_\_\_

\_\_\_\_\_ By: \_\_\_\_\_

CITY OF DEXTER  
a Michigan Municipal Corporation

\_\_\_\_\_ By: \_\_\_\_\_

President

\_\_\_\_\_ By: \_\_\_\_\_

City Clerk

STATE OF MICHIGAN       )  
  )SS.  
COUNTY OF                )

The foregoing instrument was acknowledged before me this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, by \_\_\_\_\_, and \_\_\_\_\_.

\_\_\_\_\_  
Notary Public  
\_\_\_\_\_ County, Michigan  
My commission expires: \_\_\_\_\_

STATE OF MICHIGAN       )  
  )SS.  
COUNTY OF                )

The foregoing instrument was acknowledged before me this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, by \_\_\_\_\_, City President, and \_\_\_\_\_, City Clerk, of the City of Dexter, a Michigan Municipal Corporation, on behalf of the City.

\_\_\_\_\_  
Notary Public  
\_\_\_\_\_ County, Michigan  
My commission expires: \_\_\_\_\_

# APPENDIX C

## CLOSEOUT DOCUMENTS

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## GRADING CERTIFICATE

Date: \_\_\_\_\_

Ms. Courtney Nicholls, City Manager  
City of Dexter  
8140 Main St.  
Dexter, MI 48130

Site Name: \_\_\_\_\_

Site Plan #: \_\_\_\_\_

Sidwell #: \_\_\_\_\_

Design Engineer and Firm Name: \_\_\_\_\_

Address: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

Owner: \_\_\_\_\_

Address: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

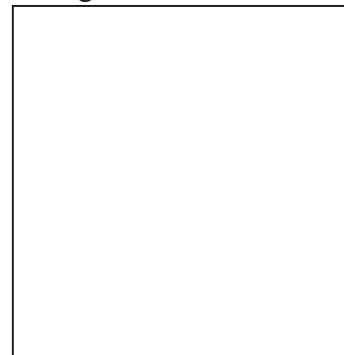
I hereby certify that the above-referenced site was graded in substantial accordance with the approved engineering plans dated \_\_\_\_\_ by OHM Advisors.

Sincerely,

\_\_\_\_\_  
Printed Name of Registered State of Michigan Engineer

\_\_\_\_\_  
Signature

Engineer's Seal



## RECORD DRAWING REQUIREMENT CHECKLIST

JOB NAME: \_\_\_\_\_ REVIEWED BY: \_\_\_\_\_

JOB NUMBER: \_\_\_\_\_ DATE REVIEWED: \_\_\_\_\_

**NOTE:** Tie down measurements and top of casting elevations to all utility structures or building corners will also be the responsibility of the engineer providing the record drawings. The use of coordinates alone to locate structures is not acceptable.

**The OHM Advisors project number must be printed in the lower right hand corner of all plan sheets.**

### SANITARY SEWER

### COMMENTS

#### I. PLAN VIEW

##### *OHM USE ONLY*

- |    |        |        |   |
|----|--------|--------|---|
| A. | [NEED] | [O.K.] | Lengths between manholes  |
| B. | [NEED] | [O.K.] | Size of pipe  |
| C. | [NEED] | [O.K.] | Lengths of casing pipe  |
| D. | [NEED] | [O.K.] | Ties to manholes  |
| E. | [NEED] | [O.K.] | Type & class of pipe & joint ("O" ring, slip, solvent weld, etc.) |
| F. | [NEED] | [O.K.] | T/casting grades  |
| G. | [NEED] | [O.K.] | Wye locations   |
| H. | [NEED] | [O.K.] | Permit numbers (County & MDEQ)                                    |
| I. | [NEED] | [O.K.] | Manufacturer of pipe  |
| J. | [NEED] | [O.K.] | Manufacturer of manhole   |
| K. | [NEED] | [O.K.] | Manhole numbering (sequential)                                    |
| L. | [NEED] | [O.K.] | Show all sanitary sewer easements on plans                        |
| M. | [NEED] | [O.K.] | Provide sketch and legal description of sanitary sewer easements  |

#### II. PROFILE VIEW (REQUIRED FOR PIPE 8" & LARGER)

##### *OHM USE ONLY*

- |    |        |        |   |
|----|--------|--------|---|
| A. | [NEED] | [O.K.] | Lengths between manholes  |
| B. | [NEED] | [O.K.] | Size of pipe  |
| C. | [NEED] | [O.K.] | Lengths of casing pipe  |
| D. | [NEED] | [O.K.] | Depth of wye & riser  |
| E. | [NEED] | [O.K.] | Invert grades   |
| F. | [NEED] | [O.K.] | Type & class of pipe & joint ("O" ring, slip, solvent weld, etc.) |
| G. | [NEED] | [O.K.] | T/casting grades  |
| H. | [NEED] | [O.K.] | Wye locations   |
| I. | [NEED] | [O.K.] | Percent slope between manholes (as-built)                         |
| J. | [NEED] | [O.K.] | Manhole numbering (sequential)                                    |

## STORM SEWER

## COMMENTS

### I. PLAN VIEW

#### *OHM USE ONLY*

A.	[NEED]	[O.K.]	Lengths between manholes/catch basins/inlets
B.	[NEED]	[O.K.]	Size of pipe
C.	[NEED]	[O.K.]	Ties to manholes/catch basins/inlets
D.	[NEED]	[O.K.]	Type & class of pipe & joint
E.	[NEED]	[O.K.]	T/casting grades
F.	[NEED]	[O.K.]	Structure numbering (sequential)
G.	[NEED]	[O.K.]	Special structures (low head, 5' dia., 6' dia., 2' sump, etc.)
H.	[NEED]	[O.K.]	Show all easements for storm sewer
I.	[NEED]	[O.K.]	Provide sketch and legal description of storm sewer easements

### II. PROFILE VIEW (REQUIRED FOR PIPE 12" & LARGER)

#### *OHM USE ONLY*

A.	[NEED]	[O.K.]	Lengths between manholes
B.	[NEED]	[O.K.]	Size of pipe
C.	[NEED]	[O.K.]	Type & class of pipe & joint
D.	[NEED]	[O.K.]	Invert grades
E.	[NEED]	[O.K.]	T/casting grades
F.	[NEED]	[O.K.]	Structure numbering (sequential)
G.	[NEED]	[O.K.]	Percent slope between manholes (as-built)

## WATER MAIN

## COMMENTS

### I. PLAN VIEW

#### *OHM USE ONLY*

A.	[NEED]	[O.K.]	Lengths between gate valve & wells, hydrants and fittings
B.	[NEED]	[O.K.]	Size of pipe
C.	[NEED]	[O.K.]	Ties to gate valve & wells, hydrants and fittings
D.	[NEED]	[O.K.]	Ties to hydrants
E.	[NEED]	[O.K.]	Ties to stop boxes
F.	[NEED]	[O.K.]	Ties to building or offsets to pipe
G.	[NEED]	[O.K.]	Type and class of pipe w/or without Polywrap
H.	[NEED]	[O.K.]	Finish grade of hydrants
I.	[NEED]	[O.K.]	T/Casting grades
J.	[NEED]	[O.K.]	Horizontal bend locations
K.	[NEED]	[O.K.]	Location of thrust blocks & types of restraints
L.	[NEED]	[O.K.]	Sequentially numbered G.V. & wells
M.	[NEED]	[O.K.]	Permit numbers (County & MDEQ)
N.	[NEED]	[O.K.]	Manufacturer of pipe
O.	[NEED]	[O.K.]	Manufacturer of hydrant
P.	[NEED]	[O.K.]	Show all water main easements on plan
Q.	[NEED]	[O.K.]	Provide sketch and legal description of water main easements

## **WATER MAIN (continued)**

## **COMMENTS**

### **II. PROFILE VIEW (REQUIRED FOR PIPE 12" & LARGER)**

#### *OHM USE ONLY*

A.	[NEED]	[O.K.]	Lengths between grade changes
B.	[NEED]	[O.K.]	Size of pipe
C.	[NEED]	[O.K.]	Type and class of pipe
D.	[NEED]	[O.K.]	G.V.. & well location
E.	[NEED]	[O.K.]	Hydrant location (identify special structures such as blow off)
F.	[NEED]	[O.K.]	Air relief valves/blow off valve locations
G.	[NEED]	[O.K.]	Vertical bend locations
H.	[NEED]	[O.K.]	T/Casting grades

## **PAVEMENT**

## **COMMENTS**

### **I. Width and station of pavement (measured from centerline)**

#### *OHM USE ONLY*

A.	[NEED]	[O.K.]	At end of radius at intersection
B.	[NEED]	[O.K.]	At beginning of taper
C.	[NEED]	[O.K.]	At end of taper
D.	[NEED]	[O.K.]	Any changes in alignment
E.	[NEED]	[O.K.]	Radius @ intersection
F.	[NEED]	[O.K.]	Right-of-way survey data

### **II. Drives**

#### *OHM USE ONLY*

A.	[NEED]	[O.K.]	location
B.	[NEED]	[O.K.]	Width
C.	[NEED]	[O.K.]	Radius, if any

### **III. Sidewalk**

#### *OHM USE ONLY*

A.	[NEED]	[O.K.]	Location
B.	[NEED]	[O.K.]	Width
C.	[NEED]	[O.K.]	Changes in alignment
D.	[NEED]	[O.K.]	Ramps
E.	[NEED]	[O.K.]	Provide sketch and legal description for safety path & sidewalk easements

**City of Dexter  
Standards  
For submitting  
Digital As-Built Drawings**

**Prepared by OHM Advisors**

**Revised June 2018**

The following digital submission specifications are being provided as minimum requirements and guidelines for consultants and developers reference. Should you have any questions or comments please contact your community representative.

**A. Digital format of CAD files**

The acceptable digital format for as-built drawing files shall be in AutoCAD format according to the following specifications:

- AutoCAD version 12.0 or later
- DWG or DXF formats as defined in AutoCAD
- Layer naming (shown in Table A) is to remain unaltered
- All polygons must be closed
- Lines shall not be unnecessarily segmented
- Intersecting lines segments must have common end points

**B. Layering scheme**

Key mapping features shall be stored on unique CAD layers. Related text shall be included with each layer (i.e., storm pipes on a single layer and storm pipe annotation on a separate single layer). See “Table A” for layer names and descriptions. Submitted drawings will go through a quality check and the layers will be verified. Drawings found not to comply will be modified by the township, or the township representative to bring them in compliance with township layering standards. Any submittals requiring modification will result in an additional fee to the consultant/developer. Submittals needing substantial modifications will result in the rejection of the digital file.

**C. Coordinate System**

All drawings shall contain adequate geodetic reference to Michigan South State Plane NAVD 88. Units must be described as either being US survey feet or international feet.

Drawings will conform to having one of the following references:

- (a) A drawing will reference a section corner/quarter-corner with distance and bearing data relating this point to the site plan.
- (b) A minimum of two (2) drawing locations will be identified with NAVD 88 coordinates established by field survey techniques (i.e., GPS or total station). Geographic coordinates shall appear in the drawing as text of a readable size and shall be in either Michigan South State Plane NAVD88.

**D. Media for delivery**

File transfer media shall be one of three options:

- CDROM or CD-R
- Flash Drive
- Electronic (Internet) file transfer

## **CADD/GIS Standard Naming Convention**

<b>Description</b>	<b>Layer name</b>
<b>Annotations</b>	
all chart lines and text*	a_chart
day stamp	a_daystamp
all legend lines*	a_legend
all location map lines and text*	a_locmap
match line	a_matchline
match line text	a_matchline_txt
north arrow	a_north
drawing notes in layout	a_note
graphic scale	a_scale
street name (major)	a_street_maj
street name (minor)	a_street_min
all title block lines*	a_tblk
*The colors and line types for these layers are set by property	

<b>Description</b>	<b>Layer name</b>
<b>Utilities</b>	
cable lines	e_cable
cable point	e_cable_pt
cable symbol	e_cable_sym
cable text	e_cable_txt
electric utility lines	e_elec
point layer for electric symbols	e_elec_pt
electric utility symbols	e_elec_sym
electric utility text	e_elec_txt
existing force main lines	e_fm
existing force main point	e_fm_pt
existing force main symbol	e_fm_sym
existing force main text	e_fm_txt
gas utility lines	e_gas
point layer for gas symbols	e_gas_pt
gas utility symbols	e_gas_sym
gas utility text	e_gas_txt
sanitary utility lines	e_san
point layer for sanitary symbols	e_san_pt
sanitary symbols	e_san_sym
sanitary utility text	e_san_txt
storm utility lines	e_stm
point layer for storm symbols	e_stm_pt

storm symbols	e_stm_sym
storm utility text	e_stm_txt
telephone lines	e_tel
point layer for telephone symbols	e_tel_pt
telephone symbols	e_tel_sym
telephone utility text	e_tel_txt
misc. utility lines	e_util
point layer for misc. utility symbols	e_util_pt
misc. utility symbols	e_util_sym
misc. utility text	e_util_txt
water main utility lines	e_wm
point layer for water main structure symbols	e_wm_pt
water main structure symbols	e_wm_sym
water main text	e_wm_txt
proposed cable lines	p_cable
proposed cable symbol	p_cable_sym
proposed cable text	p_cable_txt
proposed electric lines	p_elec
proposed electric symbol	p_elec_sym
proposed electric text	p_elec_txt
proposed force main	p_fm
proposed force main text	p_fm_txt
proposed gas lines	p_gas
proposed gas symbol	p_gas_sym
proposed gas text	p_gas_txt
proposed jack & bore	p_jbore
proposed jack & bore text	p_jbore_txt
proposed sanitary	p_san
proposed sanitary symbol	p_san_sym
proposed sanitary text	p_san_txt
proposed storm	p_stm
proposed storm text	p_stm_txt
proposed storm symbol	p_stm_sym
proposed structure text	p_*str_txt
proposed telephone lines	p_tel
proposed telephone symbol	p_tel_sym
proposed telephone text	p_tel_txt
proposed underdrain	p_udrain
proposed underdrain text	p_udrain_txt
proposed water main	p_wm
proposed water main symbol	p_wm_sym
proposed water main text	p_wm_txt
*insert the utility name here (stm, san, wm etc)	

**Description**

**Layer name**

### Miscellaneous

existing dimensions	e_dim
layers to be frozen	freeze
hatch boundaries	hatch_bound
proposed building dimension	p_bldg_dim
proposed building	p_bldg
proposed building hatch	p_bldg_hatch
proposed building text	p_bldg_txt
proposed major contours	p_conmaj
proposed minor contours	p_conmin
proposed contour text	p_cont_txt
proposed dimensions	p_dim
point layer for proposed grades	p_grade_pt
proposed elevations	p_grade_txt
proposed grading limit line	p_gradlmt
proposed grading limit dimension	p_gradlmt_dim
proposed grading limit text	p_gradlmt_txt
proposed guardrail	p_grail
proposed parking lot text	p_park_txt
proposed signs	p_sign_sym
proposed tree symbol	p_tree_sym
proposed wall	p_wall
soil boring symbol	sb_sym
soil boring text	sb_txt
viewports	vp

### Description

### Layer name

#### Drainage

drainage arrows	p_drain_sym
proposed ditch	p_ditch
proposed ditch text	p_ditch_txt
proposed drainage area text	p_drainage_txt
erosion control structures (inlet filter)	p_eroctrl_sym
erosion control text	p_eroctrl_txt
proposed silt fence	p_silt
drainage area boundaries	p_drainage

### Description

### Layer name

#### Profiles

existing centerline of structures	e_prf_cl
existing ground center	e_prf_grndc
existing ground center elevations	e_prf_grndc_txt
existing ground left	e_prf_grndl

existing ground left elevations	e_prf_grndl_txt
existing ground right	e_prf_grndr
existing ground right elevations	e_prf_grndr_txt
existing sanitary	e_prf_san
existing sanitary structure	e_prf_san_sym
existing sanitary text	e_prf_san_txt
existing storm	e_prf_stm
existing storm structure	e_prf_stm_sym
existing storm text	e_prf_stm_txt
existing text	e_prf_txt
existing water main	e_prf_wm
existing water main structures	e_prf_wm_sym
existing water main text	e_prf_wm_txt
proposed centerline of structures	p_prf_cl
proposed ditch text	p_prf_ditch_txt
proposed ditch, left	p_prf_ditchl
proposed ditch, right	p_prf_ditchr
proposed ground center	p_prf_grndc
proposed ground center text	p_prf_grndc_txt
proposed ground left	p_prf_grndl
proposed ground left text	p_prf_grndl_txt
proposed ground right	p_prf_grndr
proposed ground right text	p_prf_grndr_txt
proposed sanitary	p_prf_san
proposed sanitary structure	p_prf_san_sym
proposed sanitary text	p_prf_san_txt
proposed storm	p_prf_stm
proposed storm structure	p_prf_stm_sym
proposed storm text	p_prf_stm_txt
proposed structure labels	p_prf_str_txt
proposed text	p_prf_txt
proposed water main	p_prf_wm
proposed water main structure	p_prf_wm_sym
proposed water main text	p_prf_wm_txt
grid base	prf_base
grid elevations	prf_elev
profile grid lines	prf_grid
grid stations	prf_sta

## Description

## Layer name

### Existing topography

building lines	e_bld
building hatch	e_bld_hatch
existing building point	e_bld_pt
building text	e_bld_txt
existing building dimension	e_bld_dim

road centerline  
existing centerline point  
existing contours (major)  
existing contours (minor)  
point layer for cultural symbols  
cultural symbols (e.g. mailboxes)  
auto offset text  
existing culvert  
existing culvert point  
existing culvert symbol  
curb  
existing curb point  
ditch centerline  
existing ditch point  
driveways  
existing driveway point  
edge of asphalt  
existing asphalt hatch  
existing edge of asphalt point  
existing edge of brick  
existing edge of brick point  
existing brick hatch  
edge of concrete  
existing concrete hatch  
existing edge of concrete point  
edge of gravel  
existing gravel hatch  
existing edge of gravel point  
existing edge of other  
existing edge of other hatch  
existing edge of other point  
fence lines  
existing fence point  
fence symbols  
existing face of curb  
guardrail lines  
existing guardrail point  
guardrail symbol  
existing pavement marking  
point layer for rock symbols  
rock symbol  
existing railroad line  
existing railroad point  
existing railroad symbol  
road shoulder  
road shoulder point  
shrub line  
point layer for shrub symbols

e\_cl  
e\_cl\_pt  
e\_conmaj  
e\_conmin  
e\_cult\_pt  
e\_cult\_sym  
e\_cult\_txt  
e\_culv  
e\_culv\_pt  
e\_culv\_sym  
e\_curb  
e\_curb\_pt  
e\_ditch  
e\_ditch\_pt  
e\_dw  
e\_dw\_pt  
e\_eoa  
e\_eoa\_hatch  
e\_eoa\_pt  
e\_eobr  
e\_eobr\_pt  
e\_eobr\_hatch  
e\_eoc  
e\_eoc\_hatch  
e\_eoc\_pt  
e\_eog  
e\_eog\_hatch  
e\_eog\_pt  
e\_eoo  
e\_eoo\_hatch  
e\_eoo\_pt  
e\_fence  
e\_fence\_pt  
e\_fence\_sym  
e\_foc  
e\_grail  
e\_grail\_pt  
e\_grail\_sym  
e\_pm  
e\_rock\_pt  
e\_rock\_sym  
e\_rr  
e\_rr\_pt  
e\_rr\_sym  
e\_shldr  
e\_shldr\_pt  
e\_shrub  
e\_shrub\_pt

shrub symbols	e_shrub_sym
point layer for sign symbols	e_sign_pt
sign symbols	e_sign_sym
top and bottom of banks or slopes	e_topo
point layer for e_topo	e_topo_pt
annotations (e.g. conc., edge/asph. Etc.)	e_topo_txt
tree lines	e_tree
point layer for tree symbols	e_tree_pt
tree symbols	e_tree_sym
existing landscaping or planted areas	e_veg
existing vegetation point	e_veg_pt
sidewalk	e_walk
existing sidewalk hatch	e_walk_hatch
existing sidewalk point	e_walk_pt
wall	e_wall
existing wall text	e_wall_pt
existing wetland	e_wtInd
existing wetland hatch	e_wtInd_hatch
existing wetland point	e_wtInd_pt
edge of water	e_wtr
existing water hatch	e_wtr_hatch
existing edge of water point	e_wtr_pt

## Description

## Layer name

### Proposed design

proposed asphalt	p_eoa
proposed back of curb	p_boc
proposed road centerline	p_cl
proposed concrete	p_eoc
proposed face of curb	p_foc
proposed shoulder	p_eos
proposed walk	p_walk

## Description

## Layer name

### Staging

proposed stage lines	p_stage
proposed staging dimensions	p_stage_dim
proposed staging hatch	p_stage_hatch
stage symbols (signs, arrows, barrels etc.)	p_stage_sym
proposed staging text	p_stage_txt
Note: for multiple stages add 1, 1a. 2, 2a etc I.e. p_stage1a p_stage2 etc.	

**Description****Layer name****PMS**

proposed pavement markings  
proposed pavement marking dimensions  
proposed pavement marking symbols  
proposed pavement marking text  
proposed sign symbol  
proposed sign text

p\_pm  
p\_pm\_dim  
p\_pm\_sym  
p\_pm\_txt  
p\_sign\_sym  
p\_sign\_txt

**Description****Layer name****Removal**

proposed removal lines  
proposed removal hatch  
proposed removal symbols  
proposed removal text

p\_rem  
p\_rem\_hatch  
p\_rem\_sym  
p\_rem\_txt

**Description****Layer name****Details**

existing or lightweight object lines  
interior medium weight object lines  
heavy object lines  
detail center lines  
existing detail dimensions  
existing detail text  
hidden object lines  
detail notes  
proposed detail dimensions  
proposed detail text  
detail subtitle  
detail title  
detail hatch  
detail section lines

d\_det\_1  
d\_det\_3  
d\_det\_5  
d\_det\_cen  
d\_det\_edim  
d\_det\_etxt  
d\_det\_hid  
d\_det\_notes  
d\_det\_pdim  
d\_det\_ptxt  
d\_det\_sub  
d\_det\_title  
d\_det\_hatch  
d\_det\_sec

**Description****Layer name****Survey**

aerial control points  
aerial control text

e\_actrl  
e\_ctrl\_txt  
e\_bm\_pt

point layer for benchmarks	e_bm_sym
benchmark symbols	e_bm_txt
benchmark text	e_bndy
existing boundary line	e_bndy_dim
existing boundary dimension	e_bndy_pt
existing boundary point	e_bndy_sym
existing boundary symbol	e_bndy_txt
existing boundary text	e_brg
existing bridge line	e_brg_hatch
existing bridge hatch	e_brg_pt
existing bridge point	e_ctrl
control: traverse & benchmark lines	e_ctrl_pt
control: traverse & benchmark points	e_ctrl_sym
control: traverse & benchmarks symbols	e_ctrl_txt
control: traverse & benchmarks text	e_esmt
existing easement	e_esmt_dim
existing easement dimensions	e_esmt_txt
existing easement text	e_esmtrd
existing road easement	e_esmtrd_dim
existing road easement dimension	e_esmtrd_txt
existing road easement text	e_esmts
existing sanitary easement	e_esmts_dim
existing sanitary easement dimension	e_esmts_txt
existing sanitary easement text	e_esmtstm
existing storm easement	e_esmtstm_dim
existing storm easement dimension	e_esmtstm_txt
existing storm easement text	e_esmtwm
existing water easement	e_esmtwm_dim
existing water easement dimension	e_esmtwm_txt
existing water easement text	e_lot
existing lots	e_lot_dim
existing lot dimension	e_lot_txt
existing lot text	e_mon_pt
point layer for monument symbols	e_mon_sym
monument symbols	e_mon_txt
monument text	e_pir_sym
existing property iron symbol	e_pir_txt
existing property iron text	e_secline
section lines	e_row_dim
existing row dimension	e_row_txt
existing row text	e_secline_txt
section line text	e_row
existing row	e_setbk
existing setback line	e_setbk_dim
existing setback dimension	e_setbk_txt
existing setback text	p_bndy
proposed boundary line	p_bndy_dim
proposed boundary dimension	p_bndy_txt

proposed boundary text	p_esmt
proposed easement	p_esmt_txt
proposed easement text	p_esmtgrad
proposed grading easement	p_esmtgrad_dim
proposed grading easement dimension	p_esmtgrad_txt
proposed grading easement text	p_esmtrd
proposed road easement	p_esmtrd_txt
proposed road easement text	p_esmtsan
proposed sanitary easement	p_esmtsan_txt
proposed sanitary easement text	p_esmtstm
proposed storm easement	p_esmtstm_txt
proposed storm easement text	p_esmttemgrad
proposed temporary grading easement	p_esmttemgrad_dim
proposed temp grading easement dimension	p_esmttemgrad_txt
proposed temp grading easement text	p_esmtwm
proposed water easement	p_esmtwm_txt
proposed water easement text	p_lot
proposed lot line	p_lot_dim
proposed lot dimension	p_lot_txt
proposed lot text	p_prir_sym
proposed property iron	p_prir_txt
proposed property iron text	p_row
proposed row	p_row_dim
proposed row dimension	p_row_txt
proposed row text	p_setbk
proposed setback	p_setbk_dim
proposed setback dimension	p_setbk_txt
proposed setback text	

**CITY OF DEXTER**  
**Dedication of Public Streets and Utilities**

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Upon the completed installation of streets and or water, sewer, storm utilities by a developer, the City will consider the acceptance of the streets and utilities as public. The following is a checklist for the dedication process.

**1. Inspections** - Inspections for asphalt or concrete roads will be performed after construction of buildings are complete unless special arrangements are made and approved by the City\*(see page 2). Inspection of asphalt roads must be performed prior to placing the final wearing course. Prior to inspections of new roads, the developer shall provide copies of compaction testing, aggregate base thickness measurements, and asphalt thickness measurements. Verification that adequate inspection and testing of water and sewer mains occurred during the project will be necessary. This work is the responsibility of the developer, and the results will be submitted to the City for review. After review, the City Engineer, Utility Department, and the Department of Public Works shall conduct an on-site inspection. These procedures shall be documented as follows:

- a.) A letter from OHM Advisors stating that this step was completed, and that OHM supports this dedication.
- b.) A letter from Utility Superintendent stating that this step was completed, and that he/she supports dedication.
- c.) A letter from the DPW Superintendent stating that this step was completed, and that he/she supports dedication.

**2. Maintenance/Repair** – if any problems are identified by the on-site inspection and or the review of the test or roadway data, the developer must correct these problems before the process can continue. Once all problems have been corrected, the wearing course for asphalt roads is placed.

**3. Survey** - Sealed Engineer's drawings of the roadway sections and underground utilities being dedicated as public in each new development shall be provided to the City by the developer, along with a written description of the streets.

**4. Maintenance and Guarantee Bond** - A two-year Maintenance and Guarantee Bond in the amount equal to one half of the cost of construction of the utilities, roadway pavement, sidewalks, curb, gutter, water mains, sanitary sewers and storm drains shall be posted by the developer with the City. The amount of this bond will be based on either the signed contract for the work or on an estimate by a professional engineer. The basis of the bond amount shall be submitted to the City for review prior to the posting of the Maintenance and Guarantee Bond. An extended term on the Bond will be required for developments in which less than 100% of the buildings are constructed. Details of this requirement appear on page 2 under special arrangements.

**4. Review and approval of Dedication by Legal Counsel.** Legal Counsel will review the dedication documents and provide support for the dedication, prior to City Council accepting dedication.

**5. Resolution by City Council** - After all required information has been provided and reviewed by the City; the City Council will consider a resolution to accept public infrastructure and streets. This resolution must accompany the Act 51 application, which will be completed by the City Street Administrator.

**\*Special arrangements:** The City will ordinarily not accept streets until construction of all buildings is substantially complete, so that heavy construction vehicles do not destroy the integrity of the new streets. Many developers install all but the wearing course of asphalt during construction. When they are ready to dedicate the streets, they lay the final wearing course.

If a developer desires to dedicate prior to the completion of construction of all buildings, the developer may request that the City accept early dedication. In such cases, the developer must agree to extend the term of the Maintenance and Guarantee Bond according to the schedule below. The City Council may waive the necessity of an extended term, impose additional conditions, or refuse to accept dedication.

**If, Council accepts dedication prior to substantial completion of home construction on the site, the developer will be required to maintain the roadways until 50% of the homes are built. It is understood that maintenance will include snow removal and salting as well as general maintenance and upkeep of the roadways.**

The City Engineer shall inspect the site prior to the expiration of the Maintenance and Guarantee Bond, and report to the City the condition of the roadway/appurtenances.

100% Complete	2-Year Bond
90% to 99% Complete	3-Year Bond
80% to 89% Complete	4-Year Bond
70% to 79% Complete	5-Year Bond
60% to 69% Complete	6-Year Bond
50% to 59% Complete	7-Year Bond
Anything under 50%	8-Year Bond

**The City retains the right to withhold dedication for sites less than 50% complete.**

The developer will be required to provide documentation of the number of lots, vacant and built as part of the dedication submittal. The developer may request to replace the initial Bond for a reduced term, if 100% of the site is completed and more than 2-years remain on the initial bond term.



# ENGINEERING STANDARDS